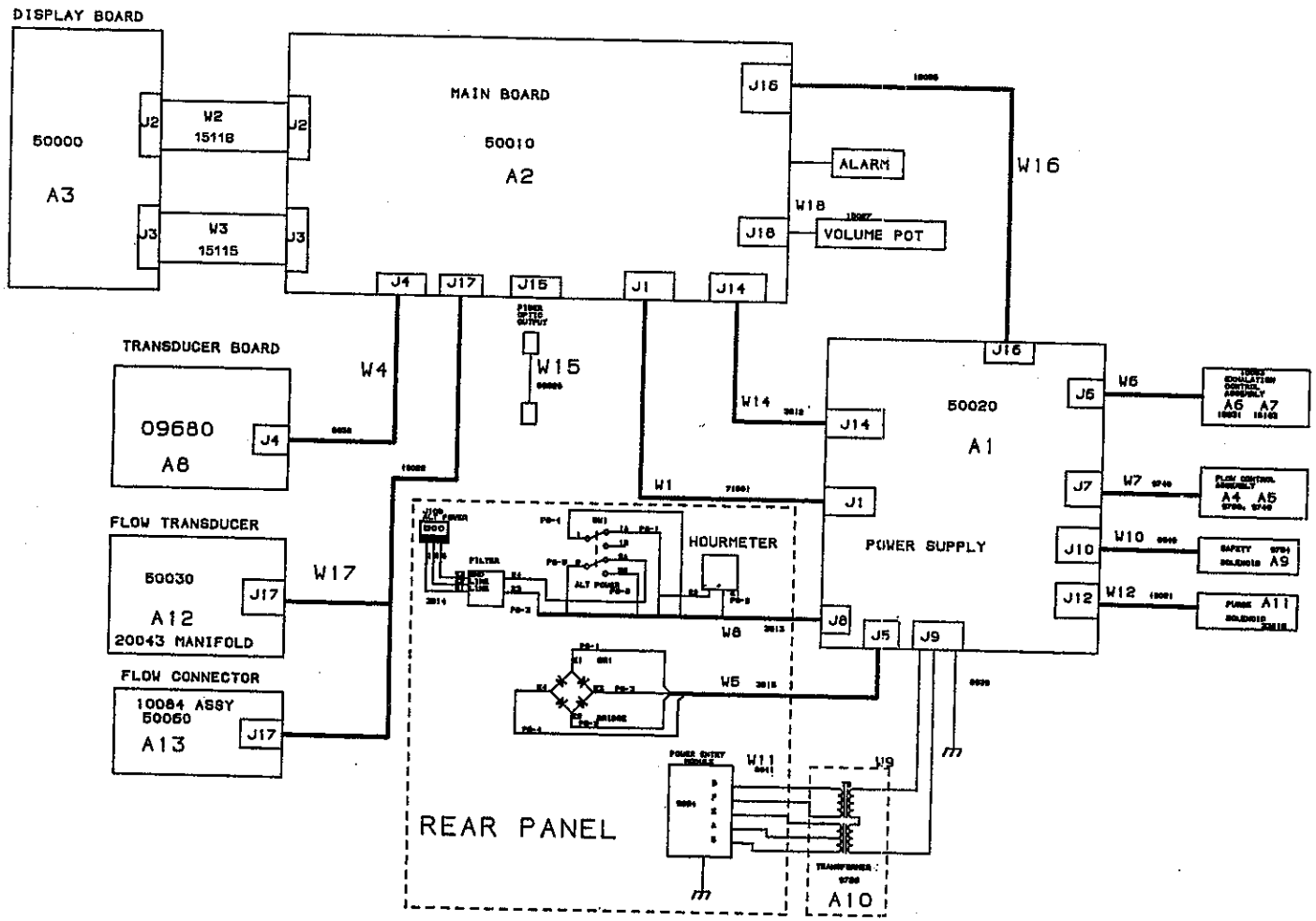
**INDEX**


| SEQUENCE OF DISASSEMBLY: | | PAGE |
|---|---|---|
| | Wiring Diagram, 8400ST Electrical System | 11-3 |
| 1 | Power Cord and Bracket Assembly P/N 08925 | 11-5 |
| 2 | Top Cover Assembly P/N 09698 | 11-5 |
| 3 | Front Panel Assembly P/N 15024 | 11-6 |
| | • Manometer P/N 09799 | 11-6 |
| | • Display PC Board P/N 50000 | 11-7 |
| 4 | Main PC Board Assembly P/N 50010 | 11-8 |
| 5 | Flow transducer PC Board and Manifold Assembly P/N 50030 | 11-9 |
| 6 | Power Transformer Assembly P/N 08939 | 11-10 |
| 7 | Power Supply PC Board Assembly P/N 50020 | 11-11 |
| 8 | Rear Panel Assembly P/N 10131 | 11-12 |
| | • Inlet Filter Assembly P/N 09762 | 11-12 |
| **Pneumatic, Mechanical and Electrical Components:** | | 11-13 |
| 9 | Flow Control Valve Assembly P/N 09740 | 11-13 |
| 10 | Exhalation Valve Assembly P/N 10083 | 11-13 |
| 11 | Flow Receptacle PCB Assembly P/N 50060 | 11-14 |
| 12 | Pressure Transducer PC Board Assembly P/N 09680 | 11-14 |
| 13 | Manometer Tubing Assembly P/N 10080 | 11-15 |
| 14 | Barbed Fittings P/N 00576 | 11-15 |
| 15 | Safety Valve Assembly P/N 09754 | 11-15 |
| 16 | Purge Valve Assembly P/N 10180 | 11-16 |
| 17 | Safety Solenoid Assembly P/N 08940 | 11-17 |
| 18 | Patient Outlet Manifold Assembly P/N 04586 | 11-17 |
| 19 | Bridge Rectifier P/N 03798A | 11-18 |
| 20 | Pressure Regulator P/N 09712 | 11-18 |
| 21 | Inlet Elbow Fitting P/N 32210 and 100 PSI Pressure Relief Valve P/N 09786 | 11-19 |
| | • 20 PSI Pressure Test Port Plug P/N 01470 | |
| 22 | Manifold Sealing Plate P/N 09631 | 11-19 |
| 23 | Manifold Gasket P/N 09632 | 11-19 |
| 24 | Rubber Bumper Feet P/N 04873 | 11-19 |
| 25 | Cleaning | 11-19 |


DISPLAY BOARD
50000
A3
J2
W2
15118
J2
J3
W3
15115
J3
MAIN BOARD
50010
A2
J16
ALARM
W16
W18
J18
VOLUME POT
J4
J17
J15
J1
J14
TRANSDUCER BOARD
09680
A8
J4
W4
W15
W14
J14
50020
A1
J16
J6
W6
A6 A7
W1
J1
J7
W7
A4 A5
FLOW TRANSDUCER
50030
A12
20043 MANIFOLD
J17
W17
HOURMETER
POWER SUPPLY
J10
W10
A9
J12
W12
A11
W8
J8
J5
J9
FLOW CONNECTOR
10084 ASSY
50060
A13
J17
W5
W11
J9
REAR PANEL
A10

FOLDOUT

## 1.0 POWER CORD AND BRACKET ASSEMBLY P/N 08925

**1.1** Remove screws securing power cord clamp (P/N 06148) or into left side of rear panel below power entry module.

**1.2** Remove power cord (P/N 08925) from power entry module (P/N 08941).

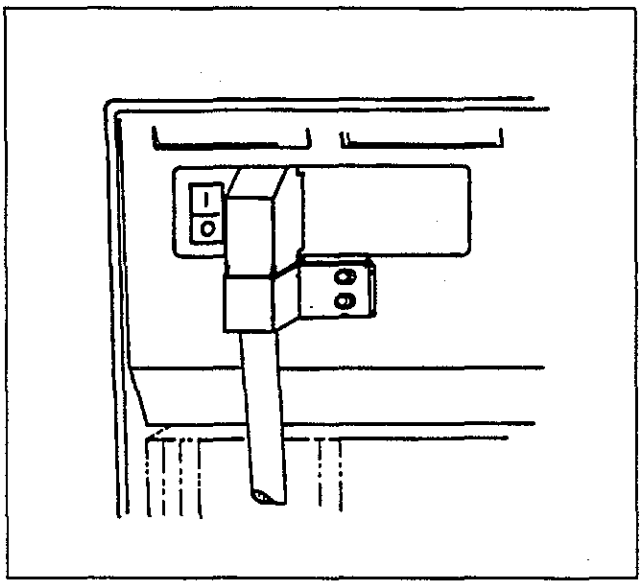


Fig. 1.0

## 2.0 TOP COVER ASSEMBLY P/N 09698

**2.1** Using 9/64" Allen driver remove two Allen screws (P/N 03222) from and washers (P/N 02159) manifold base, securing the ventilator top cover to casting. Screws are inserted from under manifold bottom through casting into top cover.

**2.2** Place ventilator upright on bench. Lift the rear end of top cover (P/N 09698) with both hands about 1-1/2" upwards and slide top cover back to disengage lip from front panel housing and remove cover.

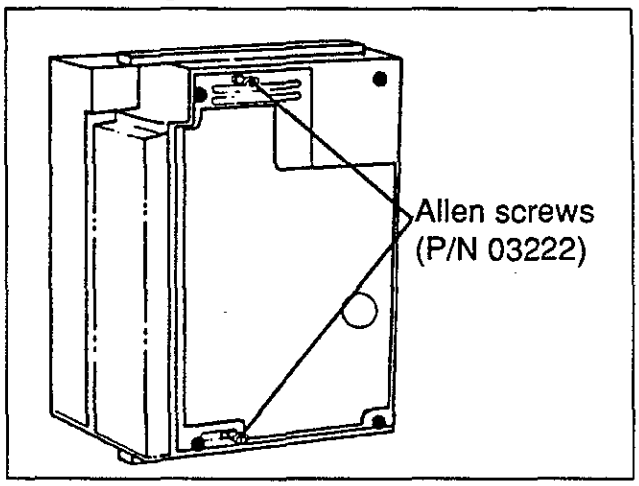



Fig. 2.0

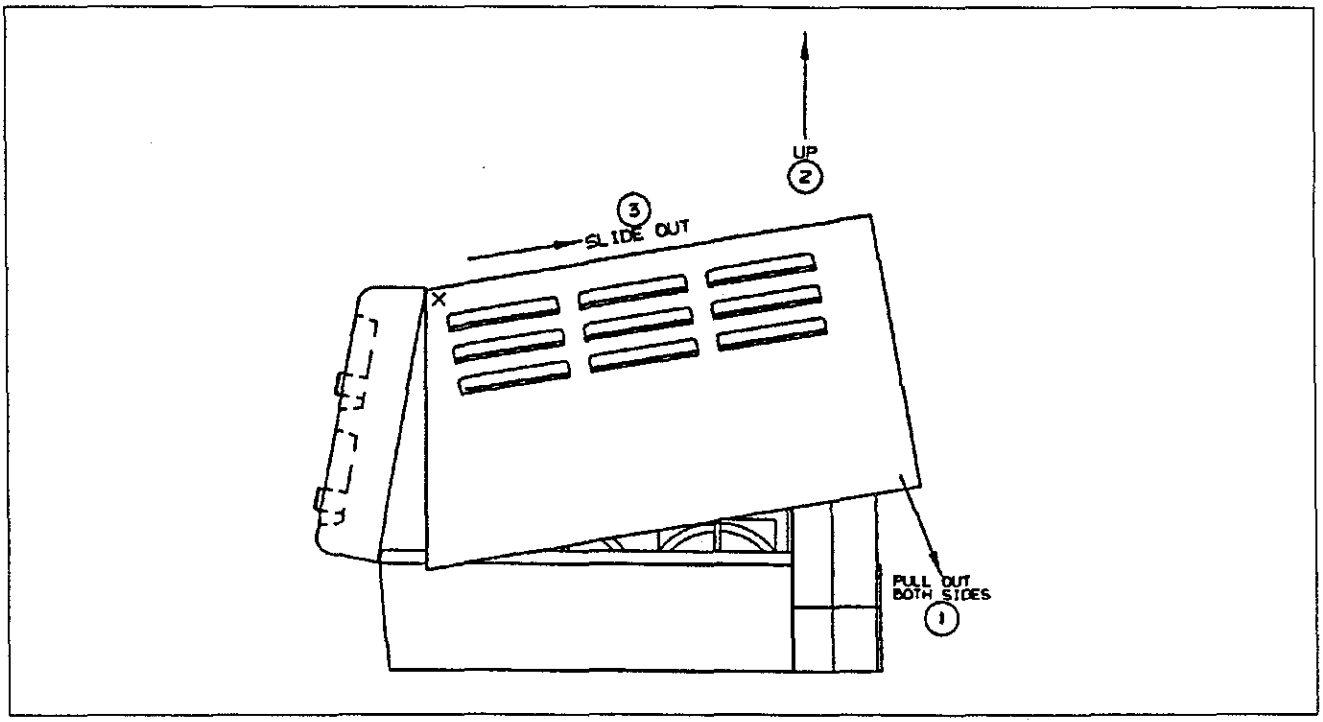



Fig. 2.1

## 3.0 FRONT PANEL ASSEMBLY P/N 15024

**3.1** At Main PCB Assembly, unplug ribbon cable (P/N 15118) at J2 and (P/N 15115) at J3.

**3.2** At manometer fitting, remove bracelet and remove tube.

**3.3** From manifold base, unscrew and remove four Allen screws (P/N 03219) and washers (P/N 08963) using a 7/64" Allen driver.

**3.4** Remove front panel from manifold base.

## 3.5 MANOMETER ASSEMBLY P/N 09799

If removal is required:

a) With a 7/64" Allen driver, remove 2 Allen screws (P/N 03219) from brackets (P/N 09639) which are holding the manometer in place.

b) Remove manometer (P/N 09799) and manometer lens (P/N 09617) if necessary.

c) Remove plug (P/N 04876) from lens and discard.

d) Clean R.T.V. sealant material from surface on inside of panel around hole opening if lens has been removed.

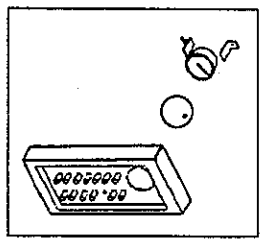


Fig. 3.1

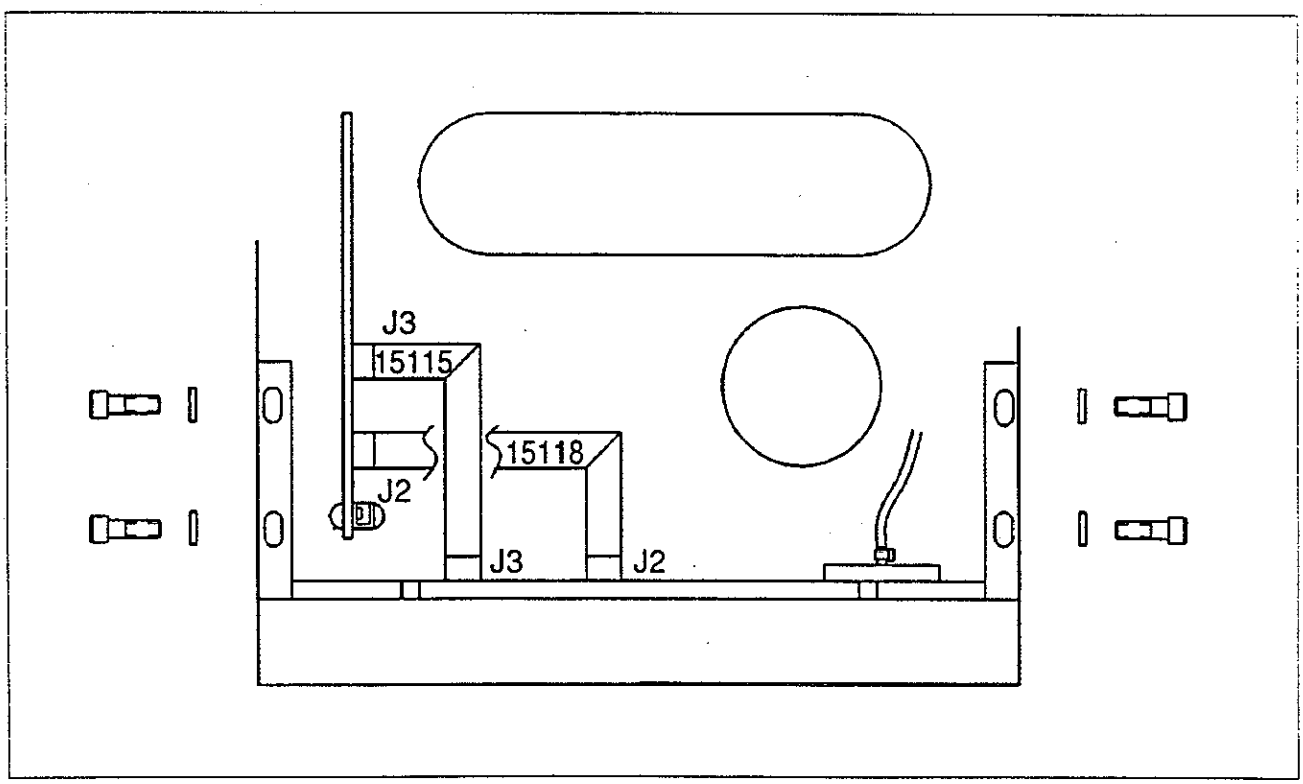



Fig. 3.0

### 3.6 DISPLAY PC BOARD ASSEMBLY P/N 50000

a) To remove Display PC Board Assembly from front panel, pull all control knobs (P/N 20238) off from potentiometer shafts.

b) From Mode selector switch located at left hand side of top row controls, remove nut and washer using a 5/16" nut driver.

c) With a 5/16" nut driver remove all 13 Jam Nuts (P/N 03281) and locknuts (P/N 03282) from potentiometer shafts.

d) Remove Display PC Board Assembly from inside of rear panel housing by removing four Allen screws (P/N 03219) with a 7/64" Allen driver.

e) Disconnect and remove Ribbon Cable Assembly (P/N 15118) (long cable) from J2 and Ribbon Cable Assembly (P/N 15115) (short cable) from J3.

f) Place Display PC Board Assembly in anti-static bag.

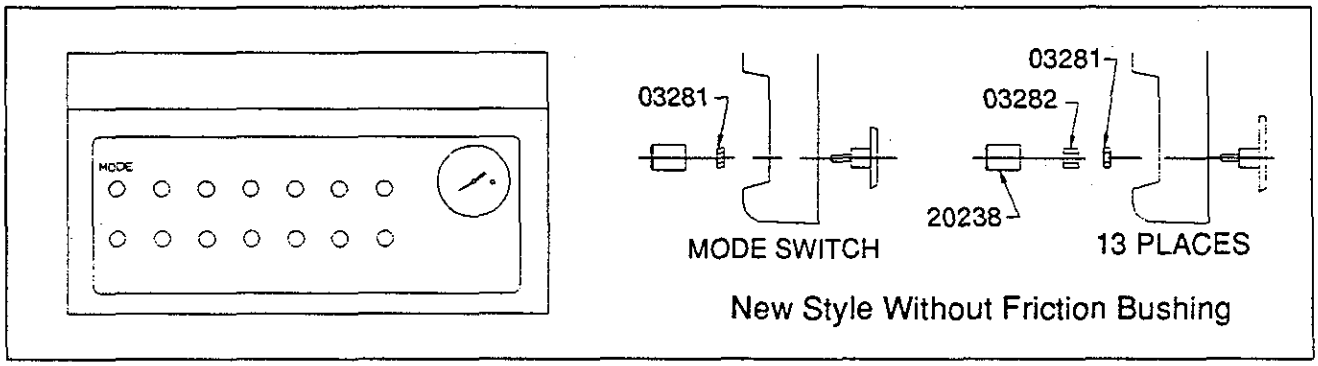



**Fig. 3.2**

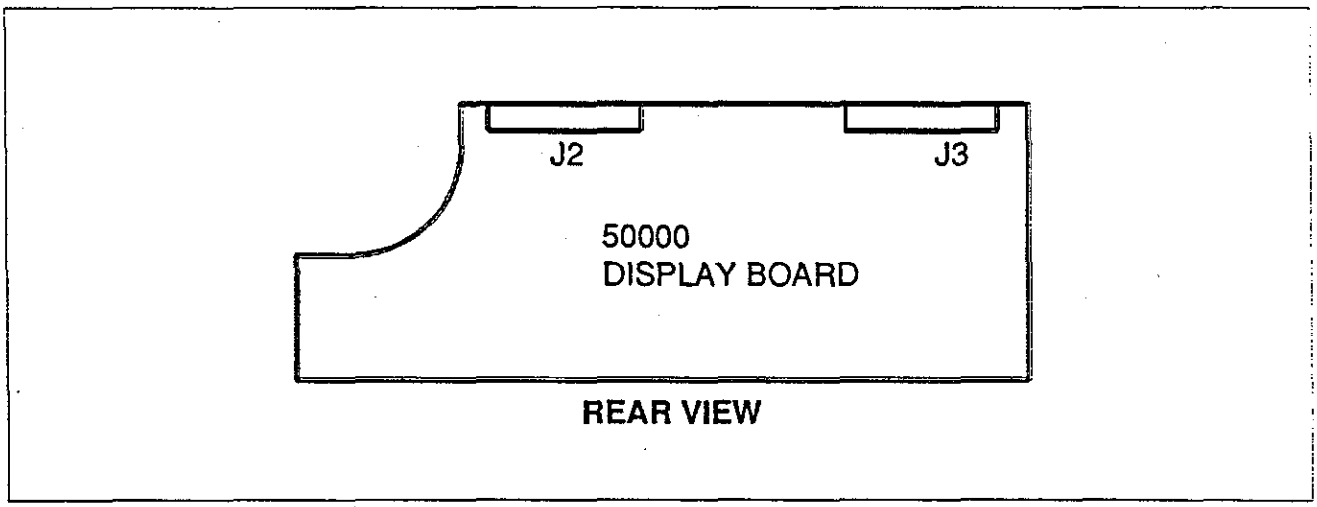



**Fig. 3.3**

## 4.0 MAIN PC BOARD ASSEMBLY, P/N 50010

**4.1** Using a 7/64" Allen driver, remove two Allen screws (P/N 03219) from upper left and right side of Main PC board.

**4.2** Lift board upwards and carefully unplug from board the following cables at the following locations.

**4.3** Ribbon Cable (P/N 15022) Flow Transducer from J17.

**4.4** Ribbon Cable (P/N 08938) circuit/ machine transducer's board from J4.

**4.5** Ribbon Cable (P/N 15025) Exhalation Valve from J16.

**4.6** Unplug alarm loudness cable wires from JP17.

**4.7** Unplug Fiber Optic Cable (P/N 09793) from J15.

**4.8** Unplug 8 Pin Cable Assembly (P/N 09793) from J14.

**4.9** Ribbon Cable (P/N 71501) main signal from J1.

**4.10** Carefully remove Main PC board assembly and place in anti-static bag.

**4.11** Using 7/64" Allen driver, remove both screws (P/N 03219) securing brackets onto manifold.

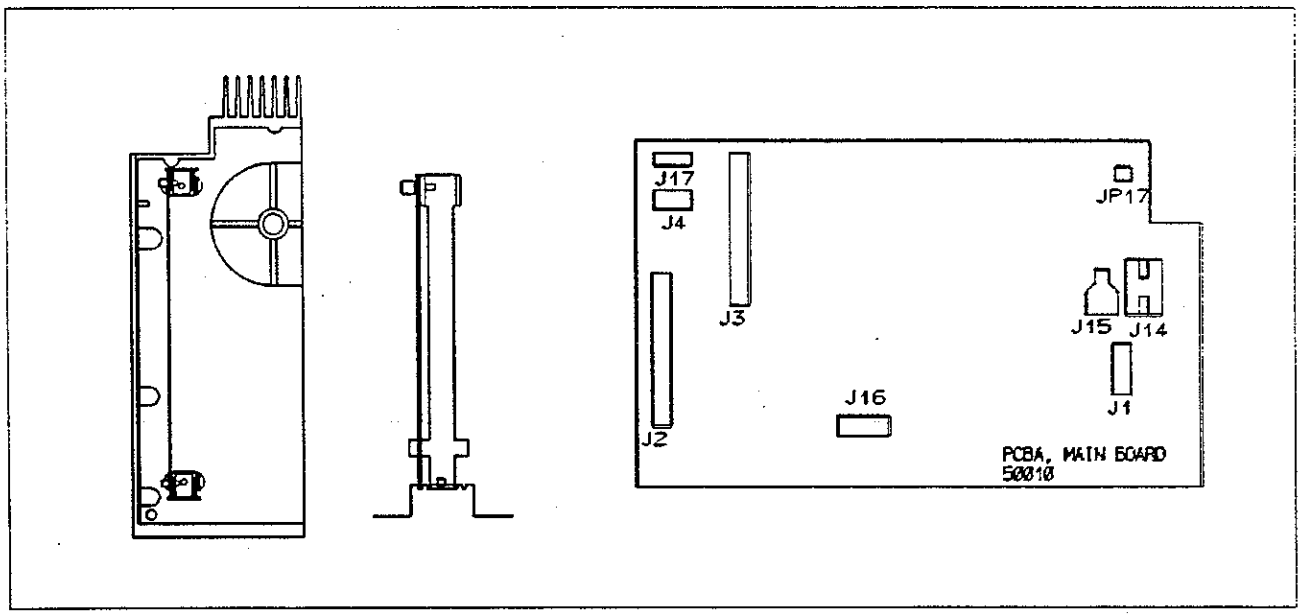



**Fig 4.0**

## 5.0 FLOW TRANSDUCER PC BOARD AND MANIFOLD ASSEMBLY P/N 50030

**5.1** By hand, remove the two sensing tubes from the back of the flow sensor receptacle PC board assembly (P/N 50060).

**5.2** Unplug the ribbon cable (P/N 15022) from flow transducer PCB (P/N 50030) at J17. Unplug solenoid connector at J17 on power supply PC board.

**5.3** Using $^{9}/_{64}$" Allen driver loosen only the two front screws (P/N 08833) securing the transformer and transducer bracket.

**5.4** Slide the flow transducer out and remove gas supply tubing from the side of flow transducer manifold.

---

**NOTE:** Flow manifold with solenoid's may be removed from flow transducer PC board, by removing two $^{7}/_{64}$" Allen screws from back of mounting bracket.

---

**5.5** Carefully place transducer PCB assembly in anti-static bag.

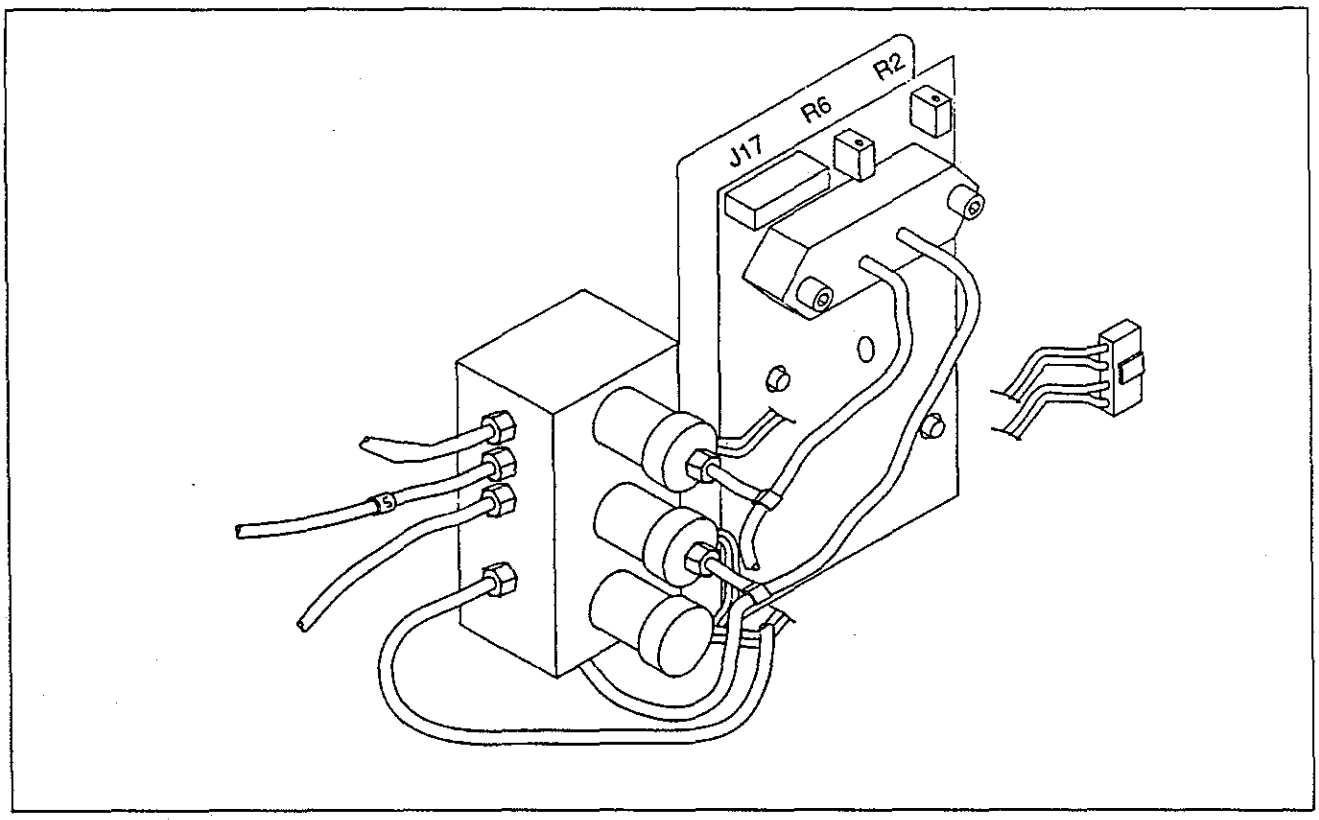



**Fig 5.0**

## 6.0 POWER TRANSFORMER ASSEMBLY P/N 08939

**6.1** Remove primary wire terminals from Power Entry Module (P/N 08941) located at right side, inside of rear panel.

**6.2** Remove green/yellow ground wire terminal (P/N 08432) from ground lug located below power entry module at inside of rear panel after removing nut (P/N 01066) with a $^{7}/_{16}$" deep socket.

**6.3** Unplug secondary output wire socket from J9 at Power PC Board Assembly (P/N 50020).

**6.4** With a $^{9}/_{64}$" Allen driver, remove four Allen screws (P/N 08833) securing transformer base onto mounting pad on main accumulator, and remove power transformer.

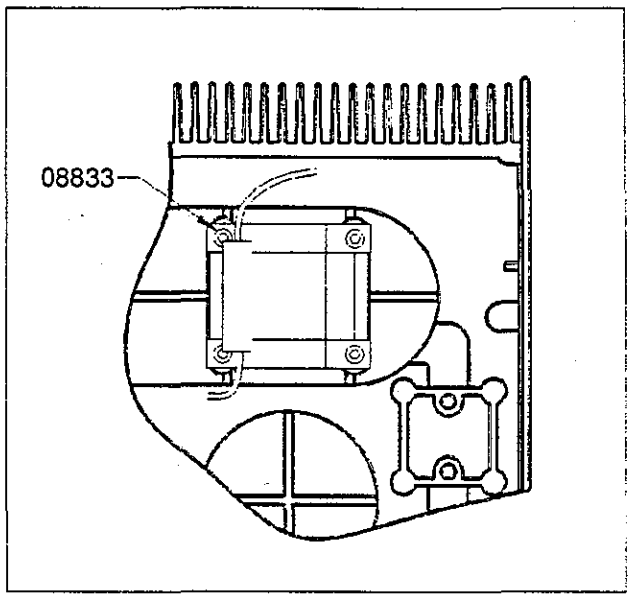



Fig 6.2

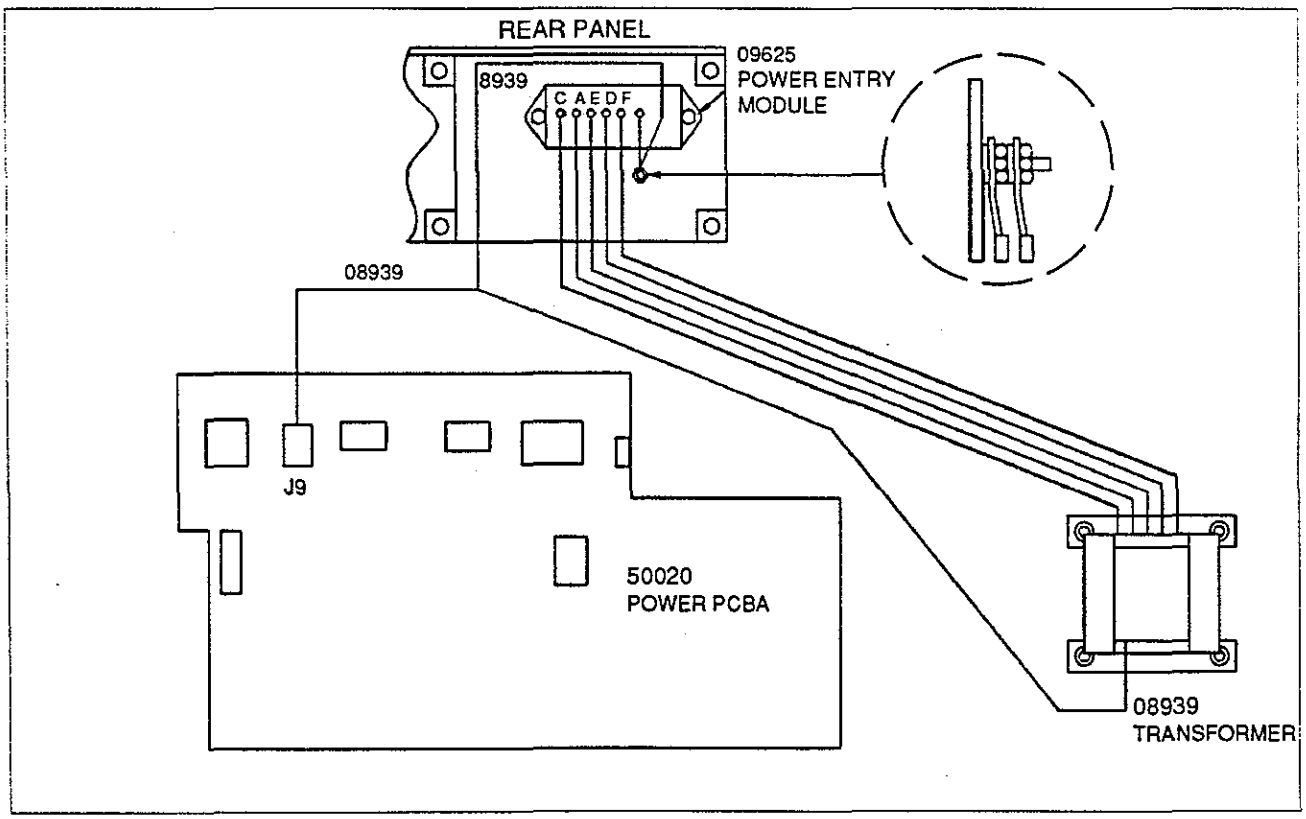



Fig 6.1

## 7.0 POWER SUPPLY PC BOARD ASSEMBLY P/N 50020

**7.1** Facing rear of casting finned area, remove all eight plugs (P/N 09764) screws (P/N 03232), washers and four plastic covers from all regulators.

**7.2** With a thin long needle nose pliers, carefully remove all four regulators and insulator gaskets. Discard gaskets.

**NOTE:** Look at finned area rear of casting, it appears there are five regulators. However, the center Regulator Cover (P/N 09764) is a blank. (DO NOT REMOVE)

See Fig. 7.0 for proper IC regulator location and identification.

**7.3** Remove four screws (P/N 03221) with a $^{7}/_{64}$" Allen driver from upper left and right hand side of finned area.

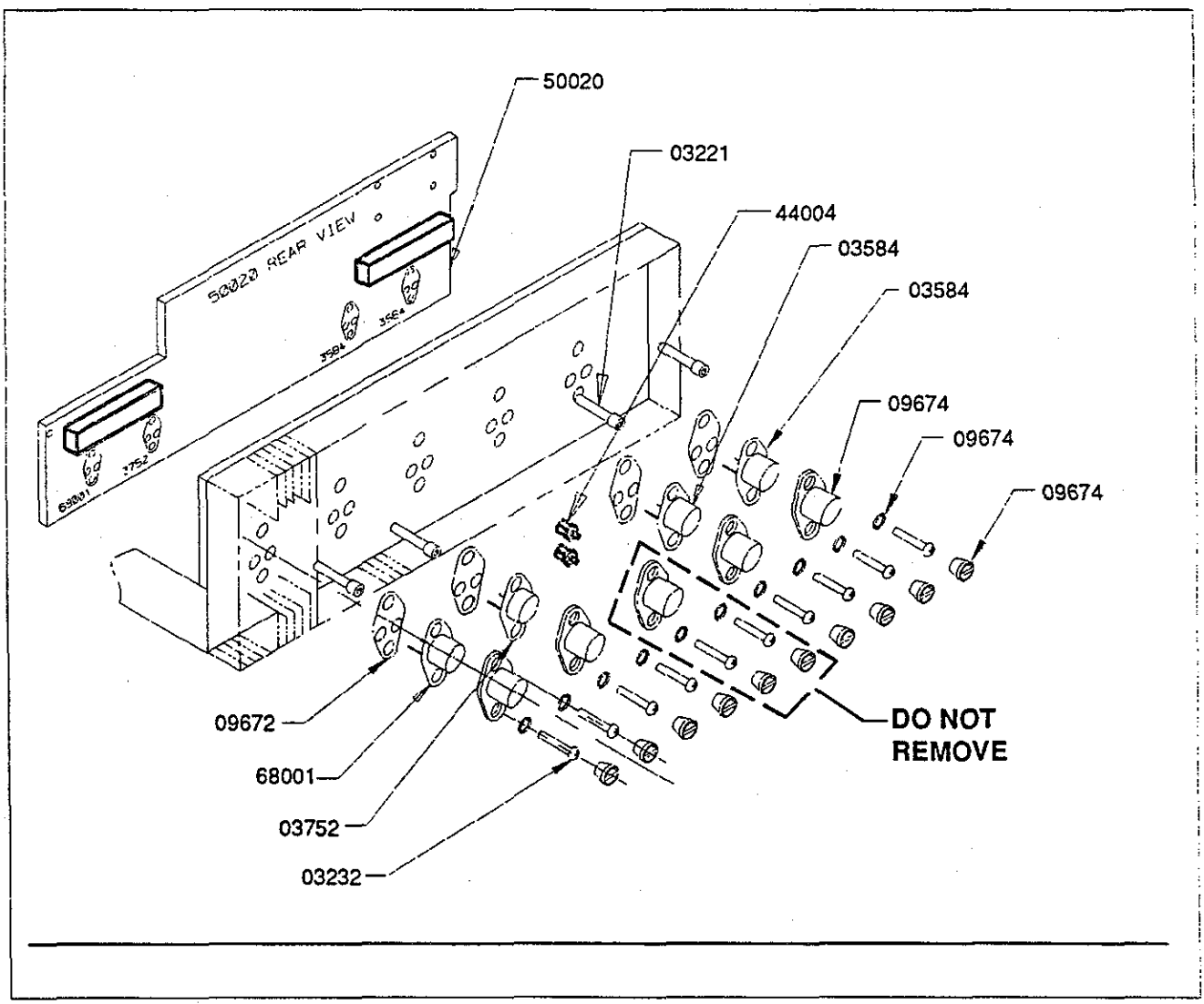



**Fig 7.0**

**7.4** Facing inside rear of ventilator, unplug from Power Supply PC Board the following cable connections:

a) Safety Solenoid (P/N 08940) at J10.
b) Flow Control Valve Assembly (P/N 09740) at J7.
c) Exhalation Valve Cable at J6.
d) Cable J12.

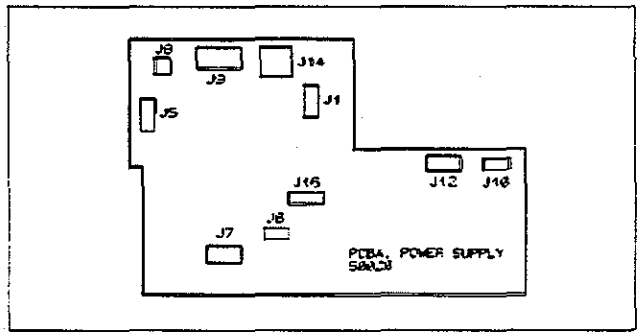



Fig. 7.1

**7.5** With 7/64" Allen driver, remove the five Allen screws (P/N 03219) holding Power Supply PC Board assembly to rear panel.

**7.6** Lift Power Supply PC Board upwards, enough to clear Bridge Rectifier (P/N 03798A) and unplug cable (P/N 03515) at J5 and cable assembly (P/N 03513) at J8.

**7.7** Carefully remove Power Supply PC Board (P/N 50020) and place in anti-static bag.

**7.8** Remove and discard Insulators (P/N 20097) from both heatsinks on the Power Supply PC Board.

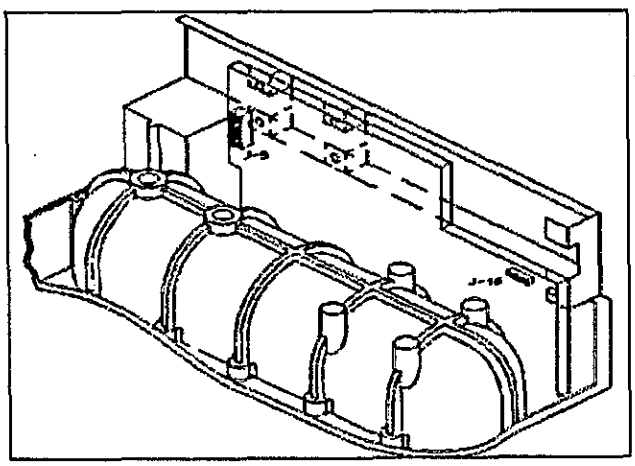


Fig. 7.2

## 8.0 REAR PANEL ASSEMBLY P/N 10131

**8.1** With screwdriver, loosen hose clamp (P/N 09787) at inlet elbow fitting (P/N 32110) located at left hand top side of accumulator and push hose clamp back.

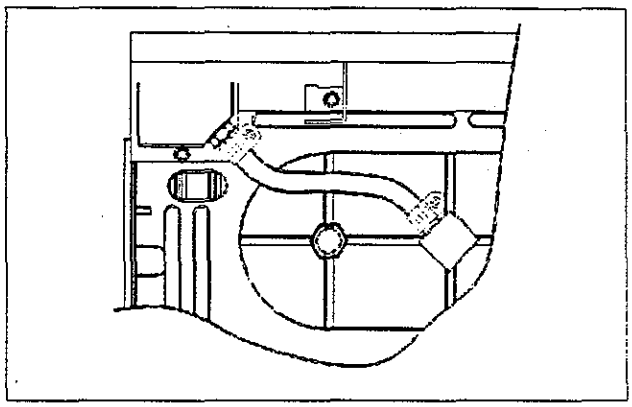


Fig. 8.1

**8.2** With a 7/64" Allen driver, remove the four Allen screws (P/N 03219) and washers (P/N 04383) securing rear panel to manifold base.

**8.3** Lift rear panel upwards, pry and remove hose from elbow fitting (P/N 32110) and remove rear panel.

**8.4** From Inlet Filter Assembly (P/N 09762) unscrew and remove glass bowl, filter element and O-ring. Discard element and O-ring.

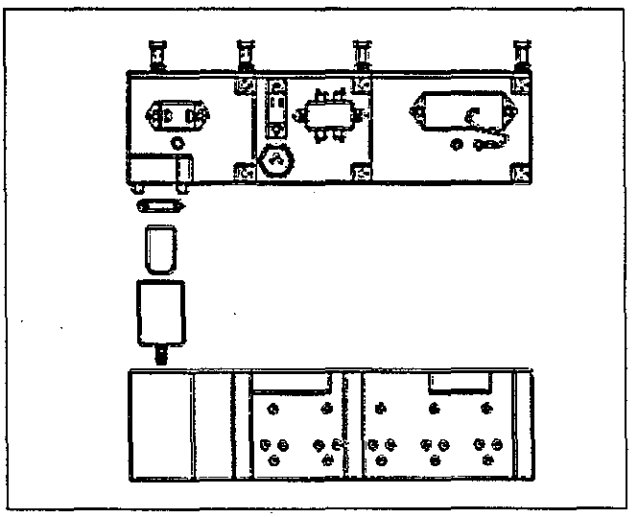


Fig. 8.2

## 9.0 FLOW CONTROL VALVE ASSEMBLY P/N 09740

**9.1** Using a 9/64" Allen driver, remove two Allen screws (P/N 03218) securing the valve assembly on manifold mounting pad and lift assembly out of unit.

**9.2** Remove and discard two O-rings (P/N 03374) from counterbore holes in base of valve body.

**9.3** Remove and discard Valve Gasket (P/N 08880) located on mounting pad. Place valve in anti-static bag.

## 10.0 EXHALATION VALVE ASSEMBLY P/N 10083

**NOTE:** When removing the exhalation valve assembly, use care when removing the screw at the lower left that retains the latch button. Behind the button is a small spring.

**10.1** Using a 7/64" Allen driver, first remove the screw (P/N 03219) that retains the latch button (P/N 20040) shoulder washer (P/N 20041), and spring (P/N 31004).

**10.2** Next remove the remaining three (3) screws (P/N 03219).

**10.3** Remove exhalation valve assembly from the unit and place in an anti-static bag.

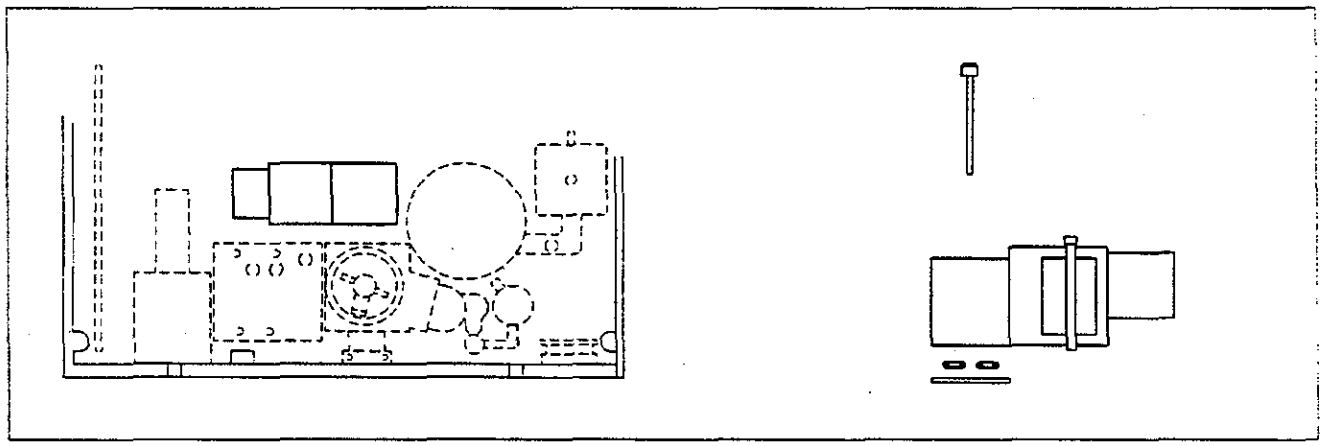


**Fig. 9.0**

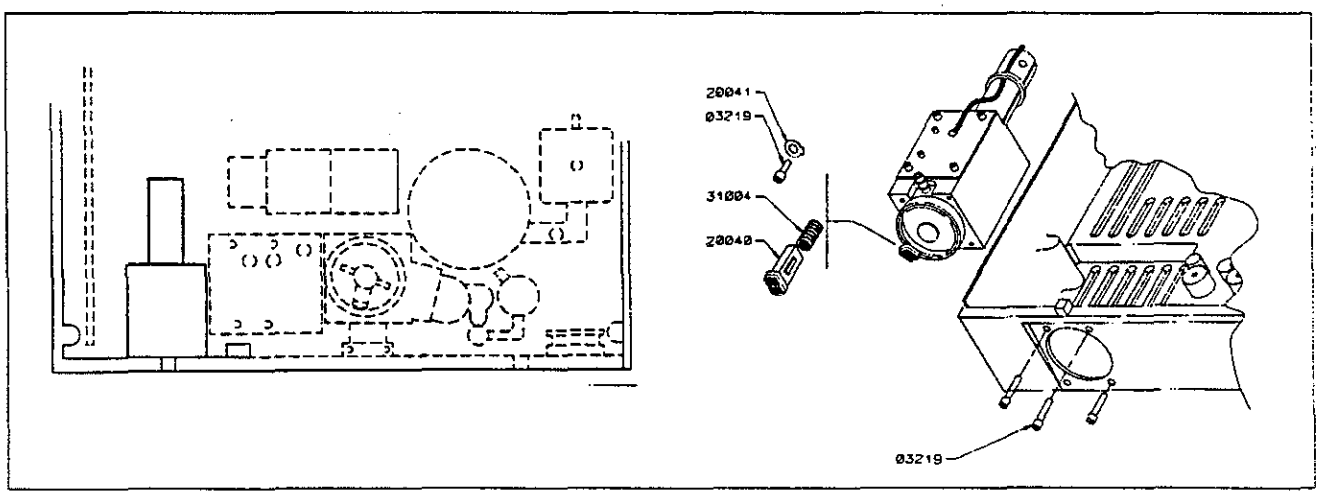



**Fig. 10.0**

## 11.0 FLOW RECEPTACLE PCB ASSEMBLY P/N 50060

**11.1** Remove flow sensor receptacle and PC Board (P/N 50060) assembly from right lower front of casing by removing four 3/32" Allen screws. Unplug ribbon cable (P/N 15022) and place assembly in anti-static bag.

## 12.0 PRESSURE TRANSDUCER PC BOARD ASSEMBLY P/N 09680

**12.1** Using 7/64" Allen driver, remove four Allen screws (P/N 03220) securing board onto manifold mounting pad, then remove board.

**12.2** Remove and discard O-rings (P/N 03372) from transducer and/or manifold mounting pad.

**12.3** Carefully place Pressure Transducer PCB Assembly in anti-static bag.

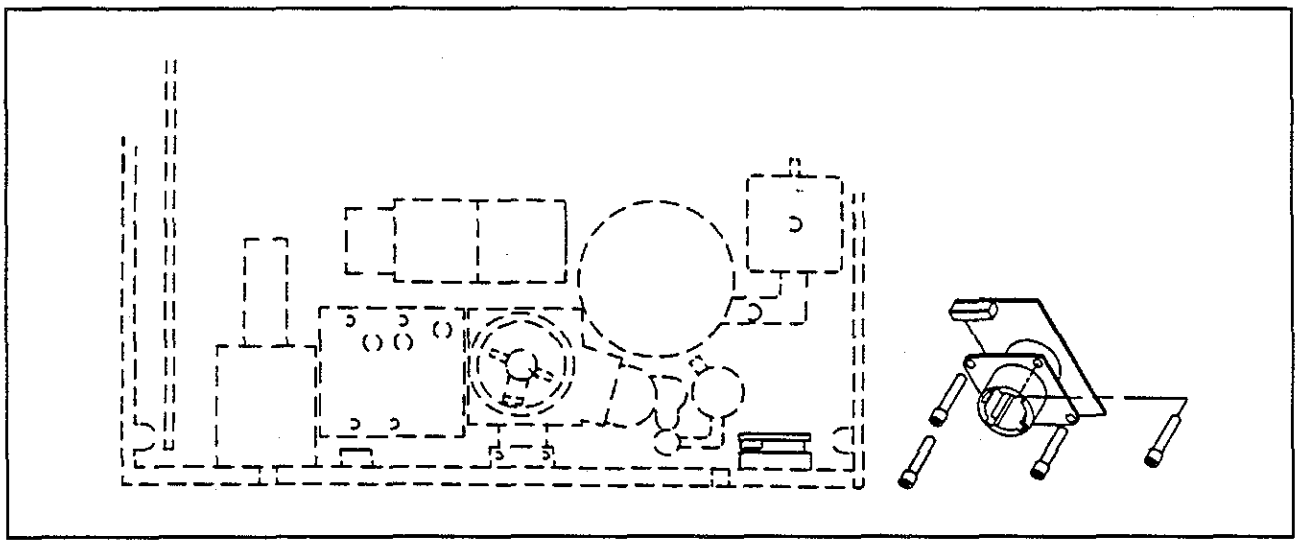


**Fig. 11.0**

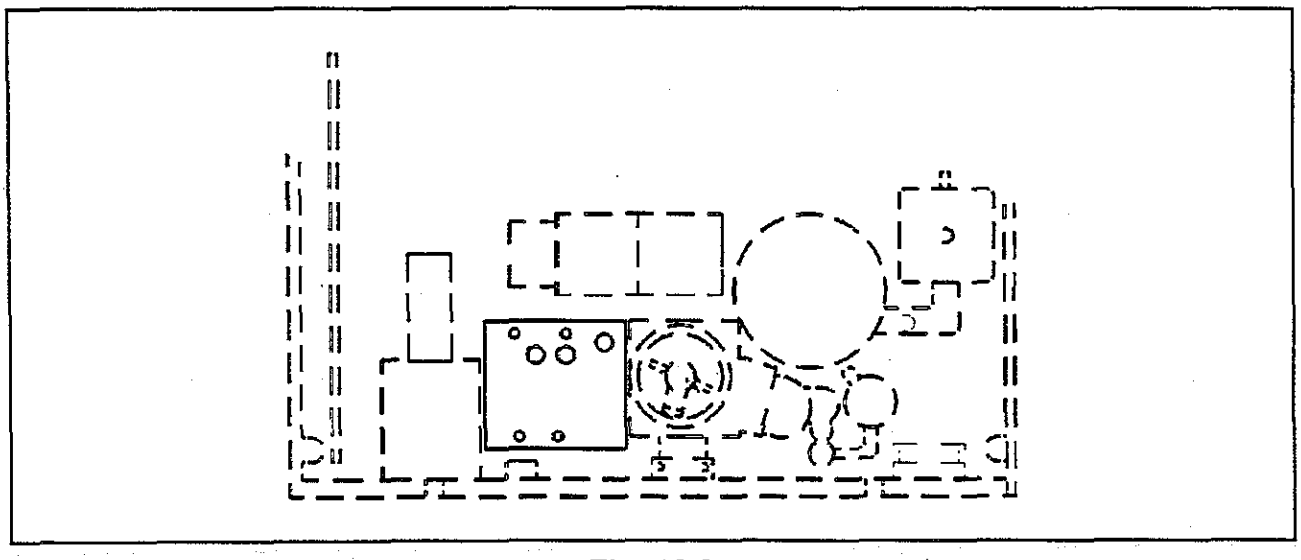


**Fig. 12.0**

## 13.0 TRANSDUCER SAFETY VALVE/MANOMETER TUBING ASSEMBLY P/N 10080

**13.1** First, twist and pull tube connector tee fitting from the Safety Valve Cap (P/N 00172A) and then remove the other three tube ends from their barbed tube fittings (P/N 00576).

## 14.0 BARBED TUBE FITTINGS P/N 00576

**14.1** With ¼" nut driver remove all three barbed tube fittings. Three (P/N 00576) on top of manifold base.

**14.2** Remove and discard all three O-rings (P/N 00114) from barbed tube fitting.

## 15.0 SAFETY VALVE ASSEMBLY P/N 09754

**15.1** Pull Regulator Purge Tube Assembly (P/N 08934) from fitting of pressure regulator.

**15.2** On opposite end of purge tube, cut cable tie wrap (P/N 07803) at elbow fitting (P/N 04506) and pull fitting out of silicone rubber elbow (P/N 09603).

**15.3** With fingers, pinch silicone rubber elbow and pull long end from manifold base and lift out.

**15.4** Pinch elbow and remove remaining short end from safety valve assembly body.

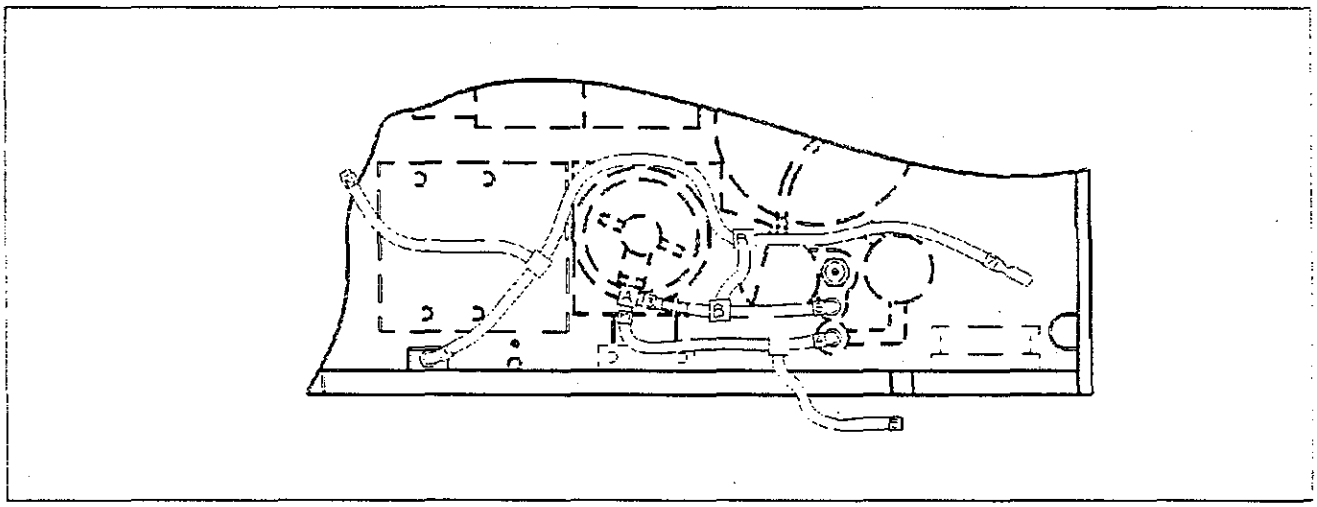


**Fig. 13.0**

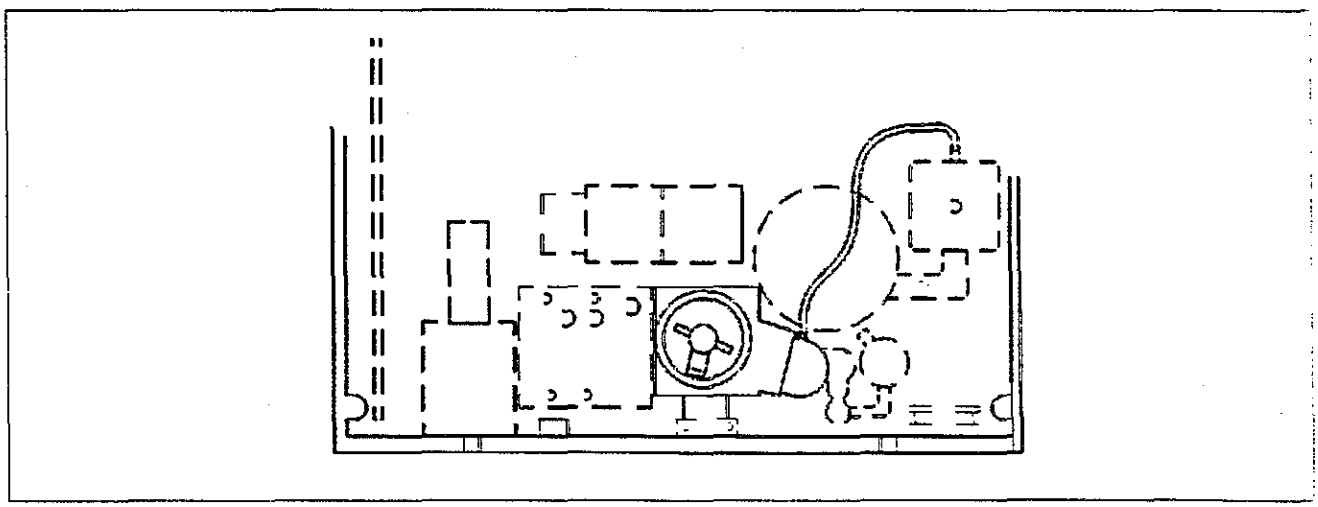


**Fig. 15.0**

## 15.5 SAFETY VALVE REMOVAL

a) At safety valve body top, unscrew valve cap (P/N 00172A), lift out diaphragm, gate assembly (P/N 10004) for cleaning or replacement.

b) With a 7/64" Allen driver, remove two Allen screws (P/N 03219) and washers (P/N 08964) securing safety valve assembly (P/N 10158) to manifold mounting pad.

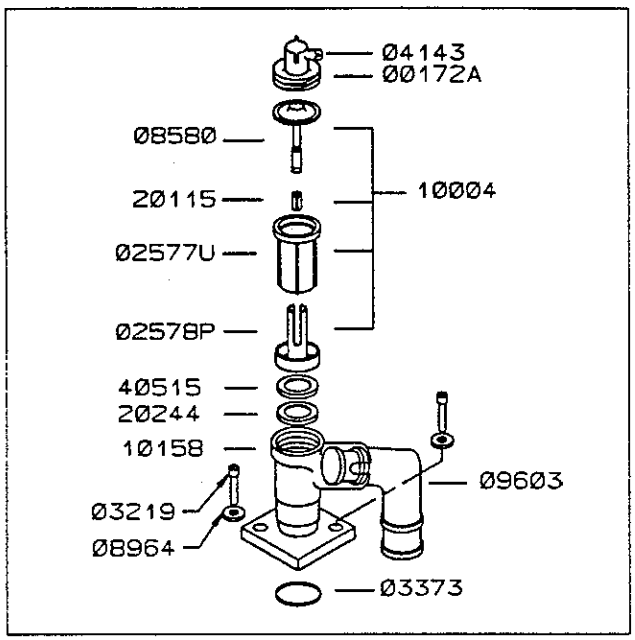



Fig. 15.1

## 16.0 PURGE VALVE ASSEMBLY P/N 10180

**16.1** With 1/2" deep socket, remove purge valve assembly from manifold base.

**16.2** Use 1/2" open end wrench, 1/2" nut driver and 3/32" Allen wrench to disassemble valve body, stem, cap, nylon washer for cleaning. Discard O-rings (P/N 00114, P/N 00138 and P/N 07849).

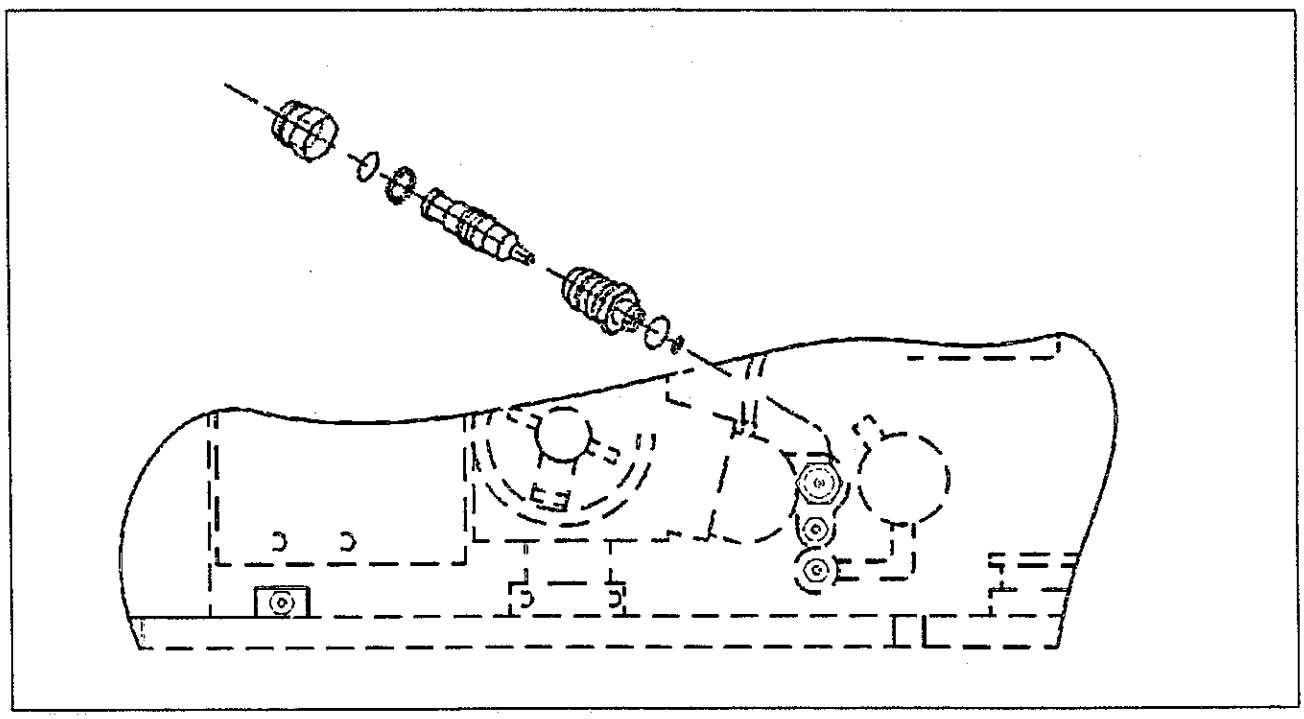


Fig. 16.0

## 17.0 SAFETY SOLENOID ASSEMBLY P/N 08940

**17.1** Cut cable tie (P/N 07803) on pad (P/N 08231) located right front side of accumulator.

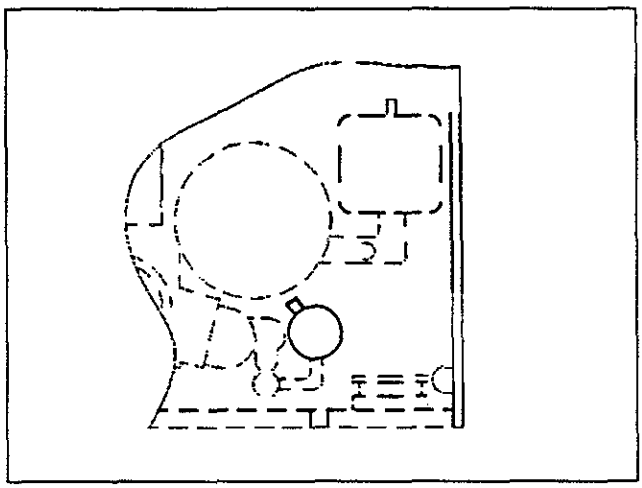


Fig. 17.0

**17.2** Insert pin of solenoid wrench (P/N 03426) in one of three holes at base of valve body (P/N 09627) and turn counterclockwise until removed.

**NOTE:** Hold up wires to prevent them from tangling while turning.

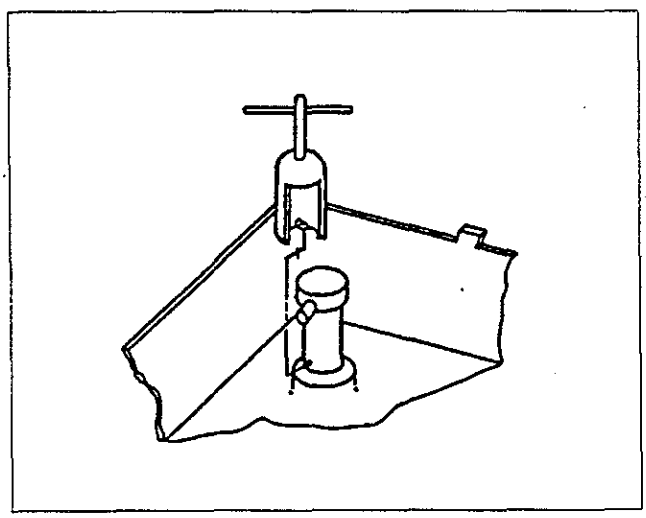


Fig. 17.1

## 18.0 PATIENT OUTLET MANIFOLD ASSEMBLY P/N 04586

**18.1** Remove RTV sealant from base of clips.

**18.2** Pull upwards to remove clip.

**18.3** From hole marked "TO HUMIDIFIER" pull patient outlet manifold towards you.

**18.4** To prevent scratching of inner surface, carefully remove O-ring (P/N 08963) and discard.

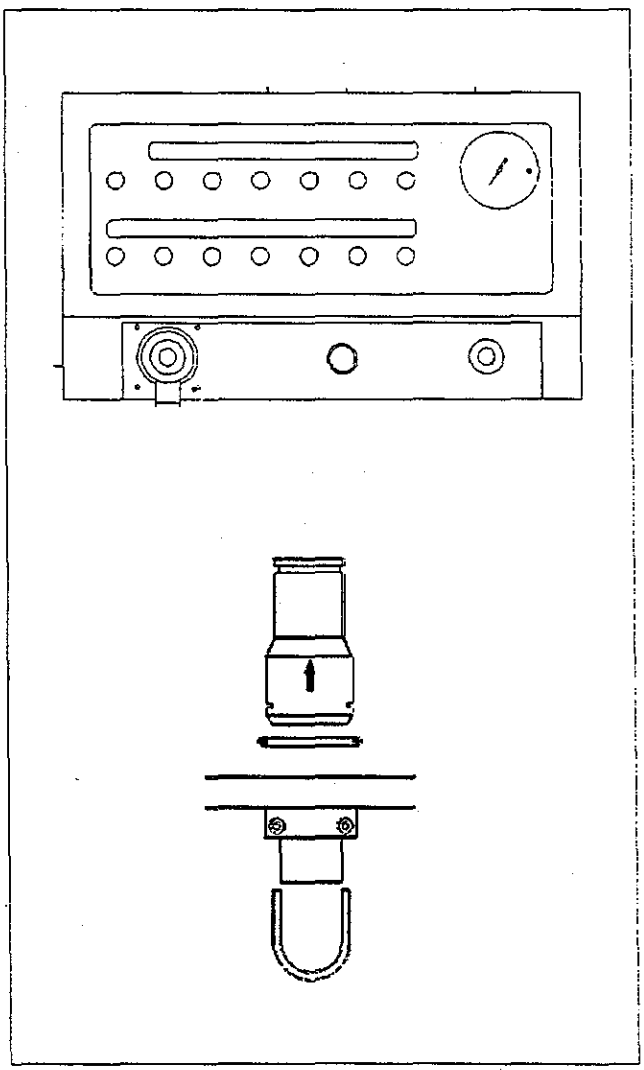


Fig. 18.0

## 19.0 BRIDGE RECTIFIER ASSEMBLY P/N 03798A

**19.1** Using #2 Philips screwdriver, remove screw (P/N 08271) from left inside corner of rear of manifold casting holding Bridge Rectifier and Insulator (P/N 03516) in place. Discard insulator.

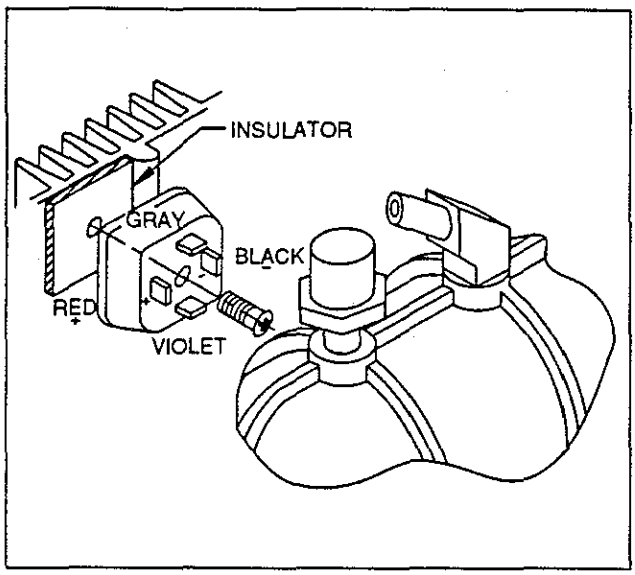



Fig. 19.0

## 20.0 PRESSURE REGULATOR P/N 09712

**20.1** Position manifold base on its fins to expose base bottom plate.

**20.2** Insert 9/64" Allen driver through holes in manifold base plate, remove four Allen screws (P/N 03257) securing regulator on mounting pad and remove regulator.

**NOTE:** Hold regulator up with your hand to support its weight during removal of screws.

**20.3** Remove and discard two O-rings (P/N 03375) from holes in regulator base.

**20.4** Remove 20 PSIG test port plug (P/N 01470). Using a common screwdriver, remove plug (P/N 01470) with O-ring (P/N 00114) from passage between pressure regulator outlet port and accumulator dampener inlet. Discard O-ring.

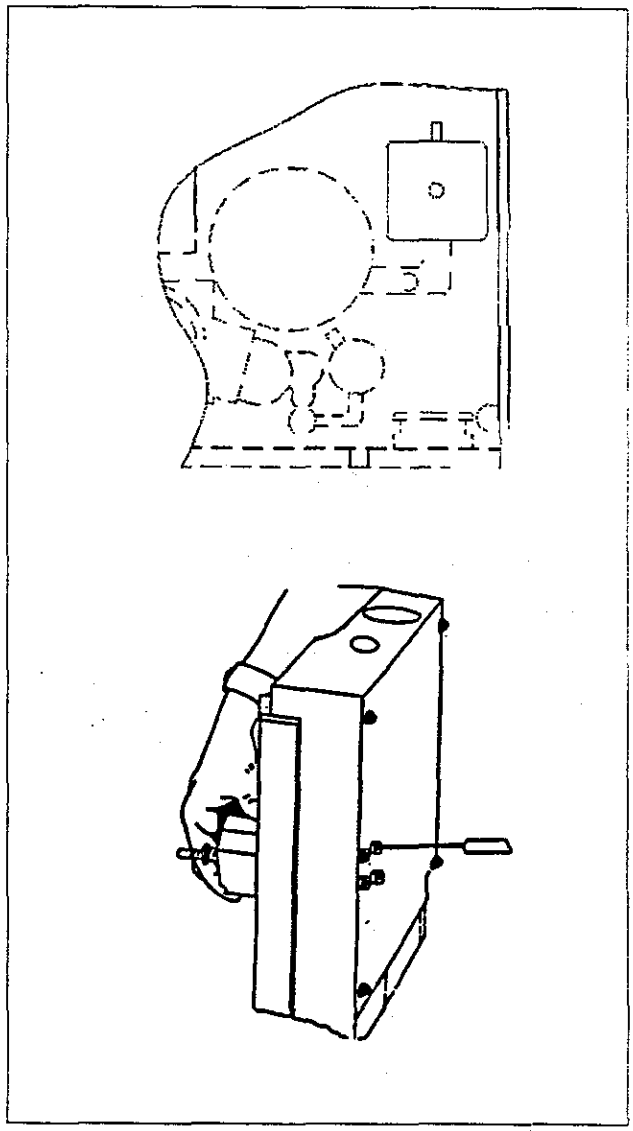


Fig. 20.0

## 21.0 INLET ELBOW FITTING P/N 32210 AND 100 PSI PRESSURE RELIEF VALVE ASSEMBLY P/N 09786

**21.1** If pressure relief valve (P/N 09786) needs replacement, remove assembly using $^{11}/_{16}$" open end wrench.

**21.2** Remove inlet fitting using $^{11}/_{16}$" wrench.

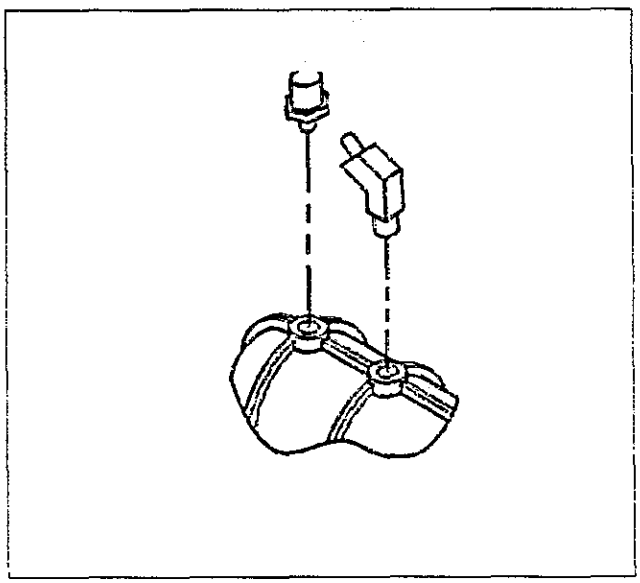


Fig. 21.0

## 22.0 CLIP, TUBE RETAINER P/N 20237 AND MANIFOLD SEALING PLATE P/N 09631

**22.1** Position manifold base with bottom plate facing upwards.

**22.2** Using a $^{5}/_{32}$" Allen driver, remove screw (P/N 02912) and retainer clip (P/N 20237).

**22.3** With $^{5}/_{32}$" Allen driver, remove the remaining 34 Allen screws (P/N 03216).

**22.4** Remove sealing plate, being careful not to scratch sealing surface.

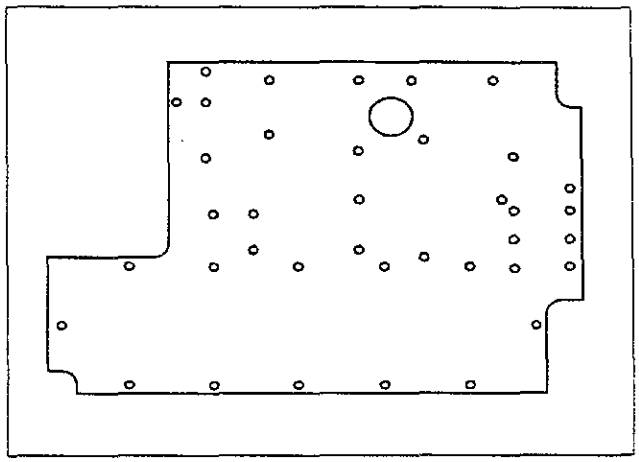


Fig. 22.0

## 23.0 MANIFOLD GASKET P/N 09632

**23.1** Remove manifold gasket and discard.

## 24.0 RUBBER BUMPER FEET P/N 04873

**24.1** If replacement is required, remove bumper feet by turning them counterclockwise.

## 25.0 CLEANING

**25.1** Manifold base is now ready for cleaning. The manifold base may be soaked in a liquid detergent for superficial cleaning. After soaking, the manifold may be scrubbed if necessary to remove all debris and traces of lubricant. The manifold should then immediately be thoroughly rinsed with distilled or soft water and blown dry with clean/dry compressed air.

**25.2** Disassemble purge valve assembly (P/N 10180) and clean cap, stem, valve body as described.

**25.3** For additional information refer to Section 7, "Cleaning and Sterilization".

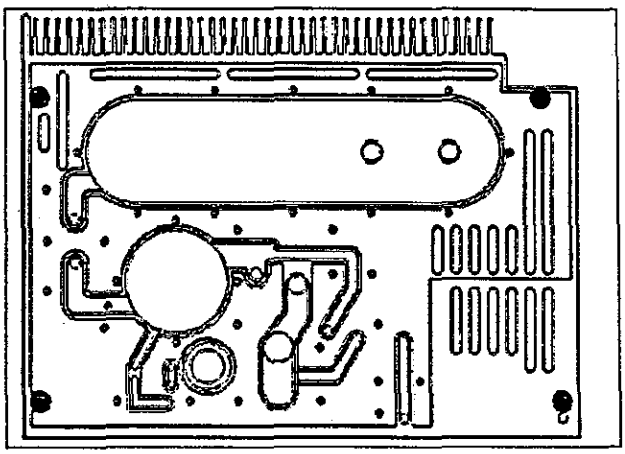


Fig. 25.0

# SECTION 12

## Assembly

# SECTION 12
# ASSEMBLY: INDEX


| | SEQUENCE OF ASSEMBLY: | PAGE |
|---|---|---|
| 1 | Inlet Elbow Fitting P/N 32210/Pressure Relief Valve P/N 09784 | 12-3 |
| 2 | Manifold Gasket P/N 09632 | 12- 3 |
| 3 | Sealing Plate P/N 09631 and Clip, Tube Retainer P/N 20237 | 12- 3 |
| 4 | Bumper Feet P/N 04873 | 12- 4 |
| 5 | Bridge Rectifier P/N 03798A | 12- 4 |
| 6 | Safety Solenoid Assembly P/N 08940 | 12- 4 |
| 7 | Leak Test Manifold P/N 20047 | 12- 5 |
| 8 | Pressure Regulator Assembly P/N 09712 | 12- 6 |
| 9 | Pressure Leak Test and/or Calibration of Regulator Assembly P/N 09712 | 12- 7 |
| 10 | Patient Outlet Manifold Assembly P/N 04586 | 12-8 |
| 11 | Safety Valve Assembly P/N 09754 | 12-8 |
| 12 | Purge Valve Assembly P/N 10180 | 12-9 |
| 13 | Barbed Tube Fittings P/N 00576 | 12-10 |
| 14 | Transducer Safety Valve/Manometer Tubing Assembly P/N 10080 | 12-10 |
| 15 | Pressure Transducer PC Board Assembly P/N 09680 | 12-10 |
| 16 | Flow Control Valve Assembly P/N 09740 | 12-11 |
| 17 | Exhalation Valve Assembly P/N 10083 | 12-12 |
| 18 | Rear Panel Assembly P/N 10131 | 12-12 |
| | • Air Coalescing Filter Assembly P/N 10131 | 12-12 |
| 19 | Power Supply PC Board Assembly P/N 50020 | 12-13 |
| | • IC Regulators; 1 ea. P/N 68001, 1 ea. P/N 03752, 2 ea. P/N 03584 | 12-14 |
| 20 | Power Transformer P/N 08939 | 12-15 |
| | • Powerboard | 12-15 |
| | • Conductivity Test | 12-16 |
| 21 | Verification Power Supply PC Board Assembly Proper Voltage Output | 12-16 |
| | • Power Supply PC Board Voltage Check | 12-17 |
| 22 | Flow Sensor Connector/PCBA P/N 50060 | 12-18 |
| 23 | Flow/Volume Transducer PCBA and Manifold Assembly P/N 50030 | 12-18 |

## INDEX


| SEQUENCE OF ASSEMBLY: | | PAGE |
|---|---|---|
| 24 | Main PC Board Assembly P/N 50010 | 12-18 |
| | • Brackets P/N 09690 | 12-18 |
| | • Ribbon Cables P/N 09758, P/N 08938, P/N 03512 | 12-19 |
| 25 | Front Panel/Display PC Board Assembly P/N 50000 | 12-19 |
| | • Resistance Check | 12-19 |
| | • Plug Cable Assembly P/N 15115, P/N 15118 | 12-20 |
| 26 | Pressure Manometer Assembly P/N 09799 | 12-21 |
| | • Manometer Bezel Lens Replacement P/N 20048 | 12-21 |
| | • Calibration | 12-21 |
| 27 | Front Panel Assembly P/N 15024 to Manifold Installation | 12-22 |
| | • Ribbon Cables | 12-22 |
| | • Pressure Manometer Tube | 12-22 |
| 28 | Power Cord P/N 08925 | 12-22 |
| 29 | Top Cover P/N 09698 | 12-23 |

## ■ MANIFOLD:

### 1.0 INLET ELBOW FITTING P/N 32110 PRESSURE RELIEF VALVE P/N 09786:

**1.1** If assembly was removed, proceed as follows:

**1.2** Place teflon tape on threaded end and hand tighten into accumulator inlets. install with $^{11}/_{16}$" open end wrench and secure.

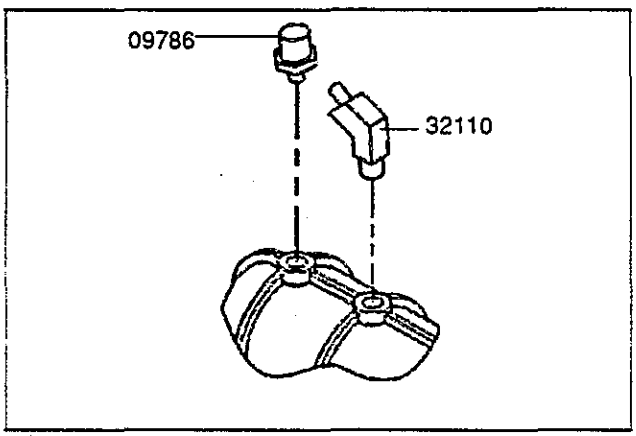



Fig. 1.0

### 2.0 MANIFOLD GASKET P/N 09632:

**2.1** Make certain that new gasket surfaces are clean.

**2.2** Position Manifold Gasket onto bottom of manifold casting assuring correct orientation and hole alignment.

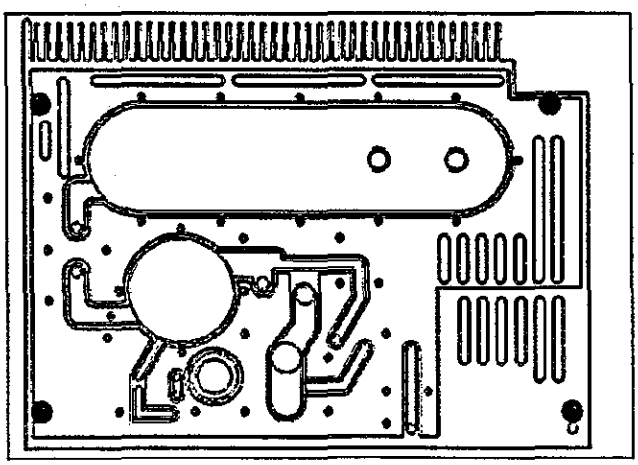


Fig. 2.0

### 3.0 SEALING PLATE P/N 09631 TUBE CLIP RETAINER P/N 20237:

**3.1** Position Sealing Plate onto gasket assuring proper hole alignment.

**3.2** Install 34 each $^{5}/_{32}$" Allen screws (P/N 03216) finger-tight only.

**3.3** Install tube retainer clip (P/N 20237) with screw (P/N 02912) at location "A" finger-tight only.

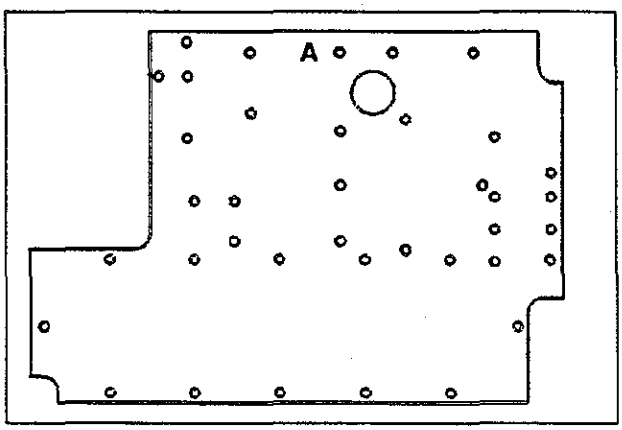



Fig. 3.1

**NOTE:** Using a spiral tightening sequence starting at No. 1 location, make two passes. First pass; tighten to 25 inch/lbs. Second and final pass; tighten to 40 inch/lbs.

**CAUTION:** It is important to follow sequence indicated!

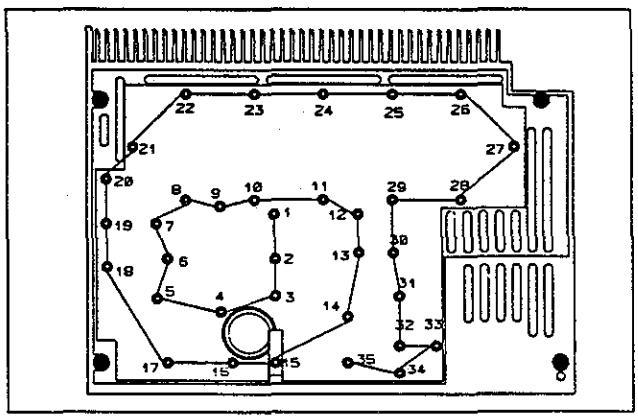



Fig. 3.2

## 4.0 BUMPER FEET, P/N 04873:

**4.1** Install 4 Bumper Feet using 7/64' Allen wrench.

## 5.0 BRIDGE RECTIFIER P/N 03798A:

**5.1** Insert screw (P/N 08271) through center of Bridge Rectifier and Insulator (P/N 03516).

**5.2** Install assembly into hole at left hand inside corner of manifold with bridge rectifier reference corner marked + in 9 o'clock position.

**CAUTION:** TIGHTEN CAREFULLY, AS RECTIFIER MAY CRACK.

**5.3** Connect terminal of wire harness (P/N 03515) as follows:

| | | |
|---|---|---|
| E3 | Red Color Cable | VDC+ |
| E2 | Gray Color Cable | AC |
| E4 | Black Color Cable | VDC- |
| E1 | Violet Color Cable | AC |

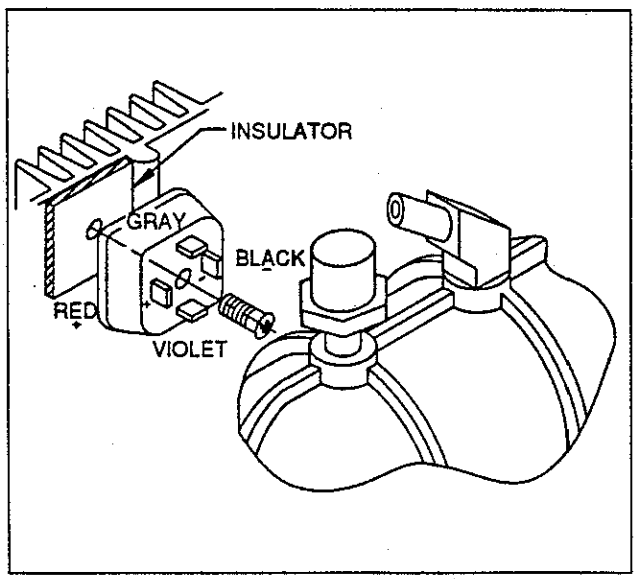



**Fig. 5.0**

## 6.0 SAFETY SOLENOID ASSEMBLY P/N 08940:

**6.1** Install Safety Solenoid (P/N 09627) using Solenoid wrench (P/N 03426). Hold wires upwards while tightening to prevent tangling.

**6.2** Position wires around dome of Pulsation Dampener Accumulator to square pad (P/N 08231) located on right front side of main accumulator.

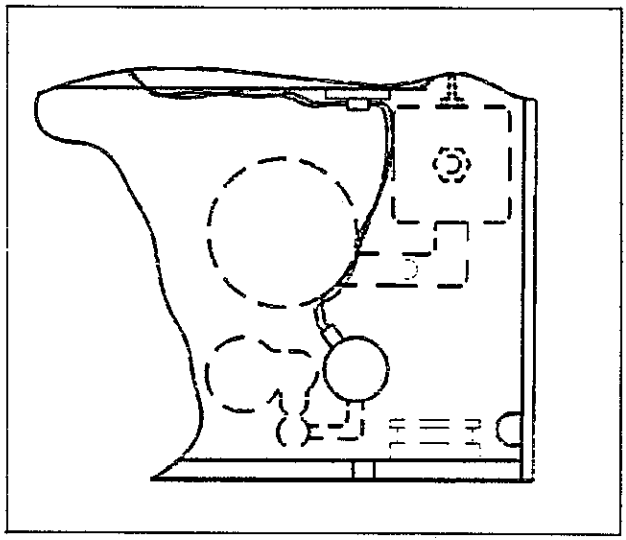


**Fig. 6.1**

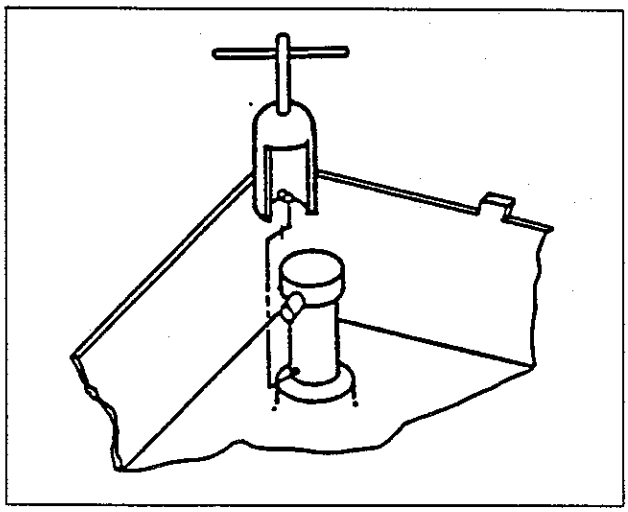


**Fig. 6.2**

## 7.0 LEAK TEST MANIFOLD P/N 20047:

**7.1** Attach Regulator Bypass Fixture (P/N 03415) to pressure regulator mounting pad and secure with four $^{9}/_{64}$" Allen screws (P/N 03257) inserted from bottom through sealing plate.

**7.2** Attach Accumulator Pressure test fixture (P/N 03416) onto flow control valve mounting pad which partially covers safety valve assembly inlet openings and one port on the pressure transducer mounting pad. Install 20 PSIG Test Port Plug (P/N 01470) with lightly lubricated O-ring (P/N 00114) into Test Port.

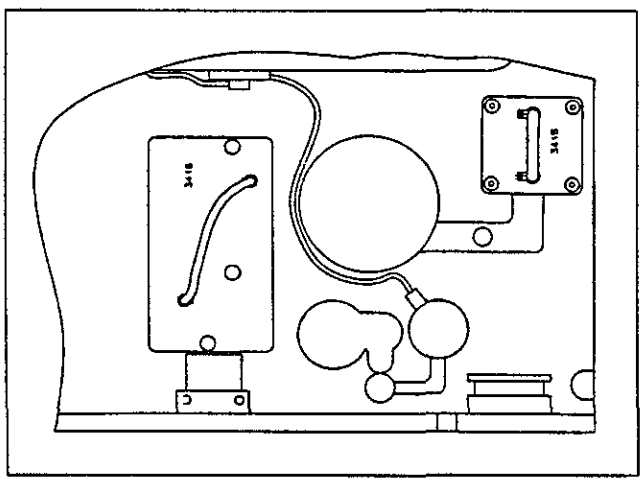


**Fig 7.1**

**7.3** Install 0-60 PSI or (4.08 kg/cm$^2$) 0-100 PSI pressure regulator to supply source, make certain that pressure regulator control is turned full counter-clockwise **-OFF-** position to prevent damage to test gauge.

**7.4** Install and secure with hose clamp (P/N 09787) test hose to elbow fitting on main accumulator.

**7.5** Connect opposite end of test hose to gas supply source.

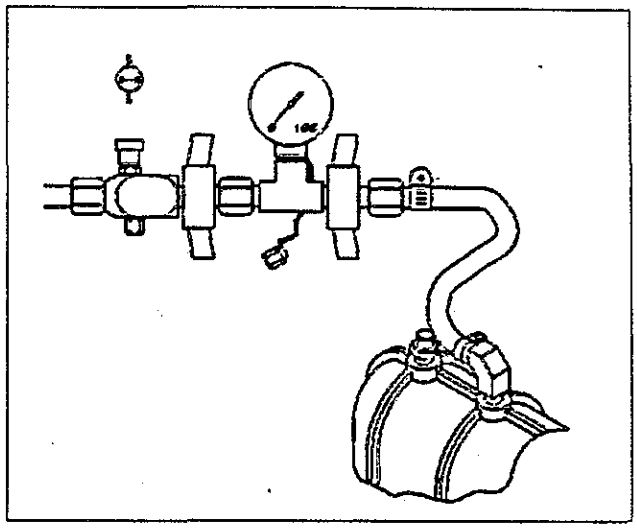


**Fig. 7.2**

**NOTE:** TURN ON-OFF VALVE TO ON POSITION.

**7.6** Turn gas source ON and adjust supply source pressure regulator to read 50 PSIG (3.40 kg/cm$^2$)on test gauge.

**7.7** Turn ON-OFF valve OFF and observe pressure behavior on test gauge. If pressure decays more than 2 PSIG per minute, check for leaks. If pressure remains stable, system is leak tight.

**7.8** If pressure decays, remedy the problem before continuing with the next step.

**7.9** Remove at this time only Regulator. Fixture (P/N 03415).

## ■ TROUBLESHOOTING:

- Check for leaks at baseplate, fittings of test fixture (P/N 03415, P/N 03416), test gauge, safety solenoid, and test hose ON-OFF valve assembly or its equivalent.

- Repeat 40 inch pound torque sequence and repeat test.
- If leak still persists, change gasket and repeat steps.

**8.0 PRESSURE REGULATOR P/N 09712:**
(Control air - 100)

**8.1** Install fitting included with regulator into side of regulator body using Teflon tape and secure with a ¼" nut driver.

**8.2** Position two O-rings (P/N 03375) into counterbore of holes in bottom of regulator.

**8.3** Position regulator on top of manifold mounting pad positioned with fitting (or part marked IN) toward rear of manifold casting.

**8.4** Secure regulator onto manifold mounting pad with four 9/64" Allen screws (P/N 03257). Tighten evenly

**NOTE:** Fairchild - position regulator on top of manifold mounting pad with fitting facing towards Display PC Board Assembly. (Bleed fitting is already installed.)

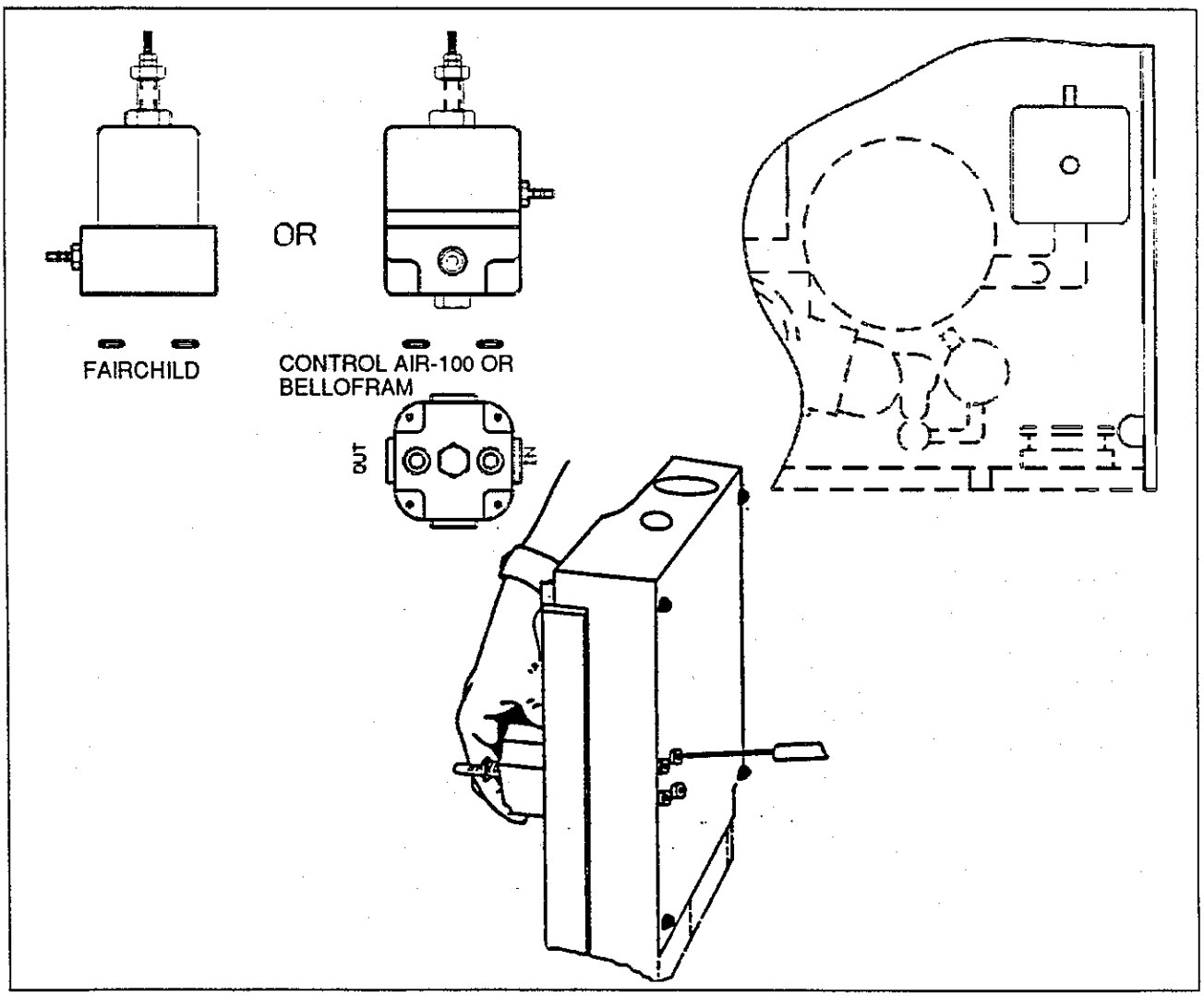



**Fig. 8.1**

## 9.0 PRESSURE LEAK TEST AND/ OR CALIBRATION OF REGULATOR ASSEMBLY P/N 09712:

**9.1** Connect 0-30 PSIG (2.04 kg/cm²) precision test gauge to test port in manifold base.

**9.2** Turn test hose assembly ON-OFF valve to ON and adjust gas source supply pressure regulator to 50 PSIG (3.4 kg/cm²).

**9.3** Regulator operating pressure as identified on test gauge should read 20 PSIG ± .4 (19.6 PSIG - 20.4 PSIG) (1.36 kg/cm² + .002).

**9.4** If regulator needs adjustment, loosen locknuts on regulator and adjust valve stem as required for pressure to read 20 PSIG on test gauge.

**9.5** Secure locknut using Vibra-Tite (P/N 03884) or equivalent locking material.

**9.6** Turn gas source supply OFF, remove test fixture (P/N 03416), test gauge and test hose assembly from inlet elbow fitting by loosening up hose clamp (P/N 09787).

## ■ TROUBLESHOOTING

☐ CAN'T ADJUST TO 20 PSIG( 1.36 KG/CM²).

- Confirm 50 PSIG (3.5 kg/cm²) supply source.
- Check for gas leaks - audible sound, remedy problem.
- Check for leaks at regulator base and mounting pad, 0-30 PSIG test gauge connections.
- Damaged 0-30 PSIG test gauge.
- Replace regulator and repeat test procedure.

☐ SLUGGISH — SLOW RESPONSE:

- Confirm 50 PSIG (3.5 kg/cm²) supply source.
- Check for leaks around 0-30 PSIG test gauge.
- Damaged O-ring(s) (P/N 03375).
- Purge line fitting partially obstructed.
- Replace regulator, repeat test procedure.

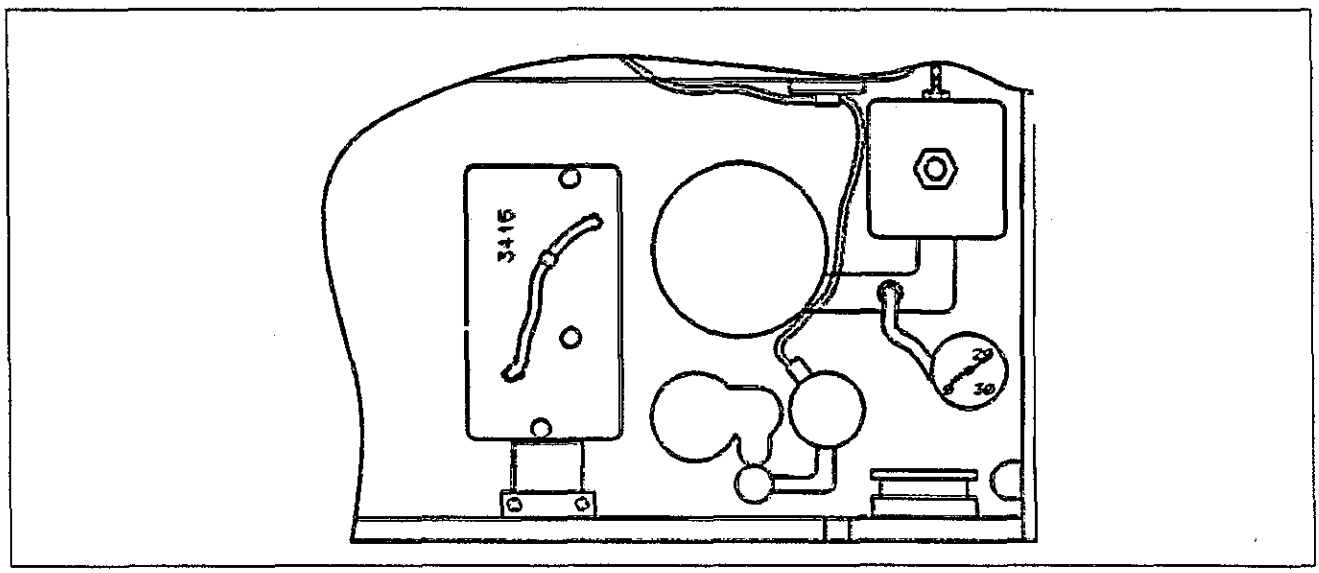



**Fig. 9.0**

## 10.0 PATIENT OUTLET MANIFOLD ASSEMBLY P/N 04586

**10.1** Install and position O-ring (P/N 08963) into hole in front flange of manifold casting marked "TO HUMIDIFIER".

**10.2** Install Patient Outlet Manifold into opening with small left to right turning motion against O-ring and align groove in patient outlet manifold body with the 2 holes in manifold base.

**10.3** With arrow in top location, insert retaining clip (P/N 09693) into holes.

**10.4** Apply RTV silicone paste around clip legs at manifold base.

**10.5** Pull on Patient Outlet Manifold and insure that manifold remains in place.

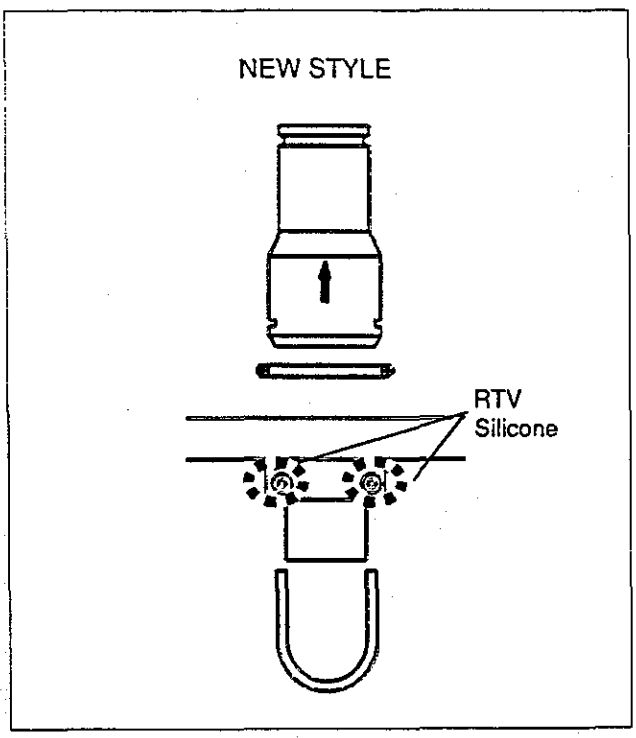



Fig 10.0

## 11.0 SAFETY VALVE ASSEMBLY P/N 09754

**11.1** Insert short leg of silicone elbow (P/N 09603) into side port of safety valve body with first ridge past notch.

**11.2** Install elbow fitting (P/N 04006) of Regulator Purge Tube Assembly (P/N 08934) into silicone elbow.

**11.3** Secure regulator purge tube on elbow fitting with bracelet (P/N 01587). If tie cable (P/N 07803) is used, cut off and discard excess length.

**11.4** Install O-ring (P/N 03373) onto inside of Safety Valve Assembly base plate.

**11.5** Position and secure safety valve baseplate with silicone elbow onto mounting pad on manifold casting with two screws (P/N 03219) and washers (P/N 08964) using a $^{7}/_{64}$" Allen driver. Tighten screws evenly.

**11.6** Insert end of long leg of silicone rubber elbow into remaining large hole in manifold casting until ridge makes contact with casting surface without kinking or collapsing.

**11.7** Install new cartridge assembly (P/N 10004) in safety valve body. Install and secure safety valve assembly cap (P/N 00172A).

**11.8** Connect open end of regulator purge tube assembly to barbed fitting on pressure regulator and secure tube with tie wrap (P/N 07803). Cut off and discard excess length.

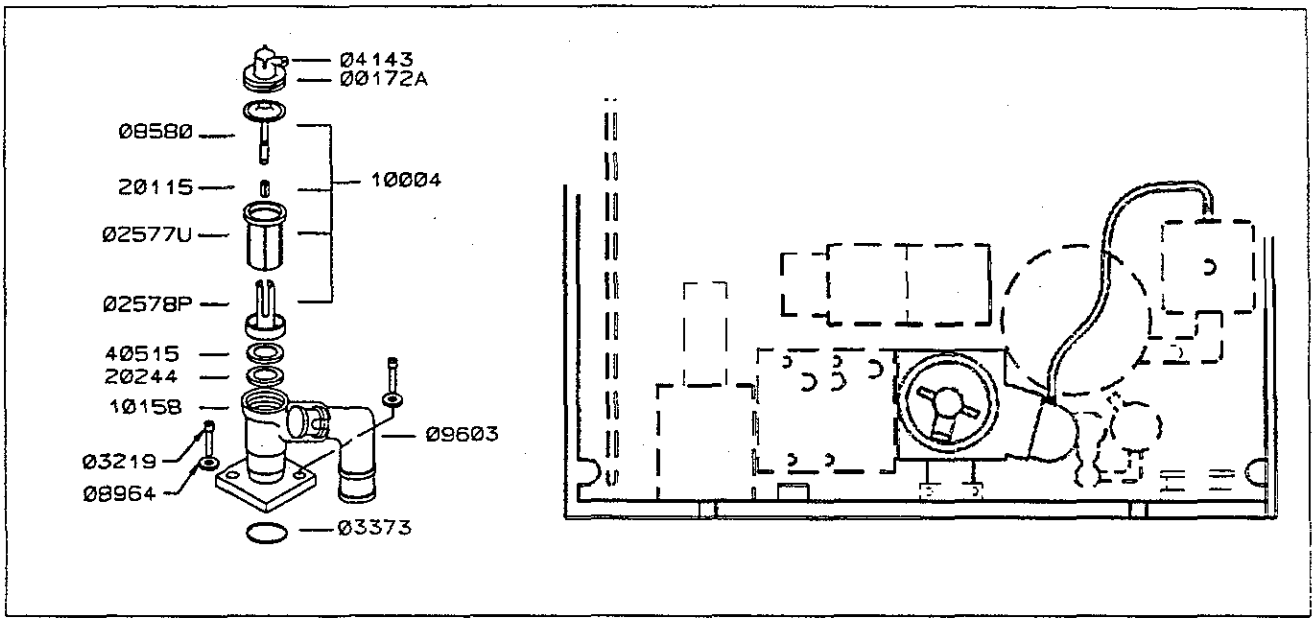



Fig. 11.0

## 12.0 PURGE VALVE ASSEMBLY P/N 10180 :

**12.1** Before installing O-rings (P/N 00138-07849), lightly lubricate them using Lubricant (P/N 00042).

**12.2** Install nylon washer (P/N 00109), O-ring (P/N 00138) on valve stem, O-ring (P/N 07849) on valve body, and position NON lubricated O-ring (P/N 00114) on inside front end of valve body.

**12.3** Use a ½" deep socket and install Valve Assembly (P/N 10180) in manifold base.

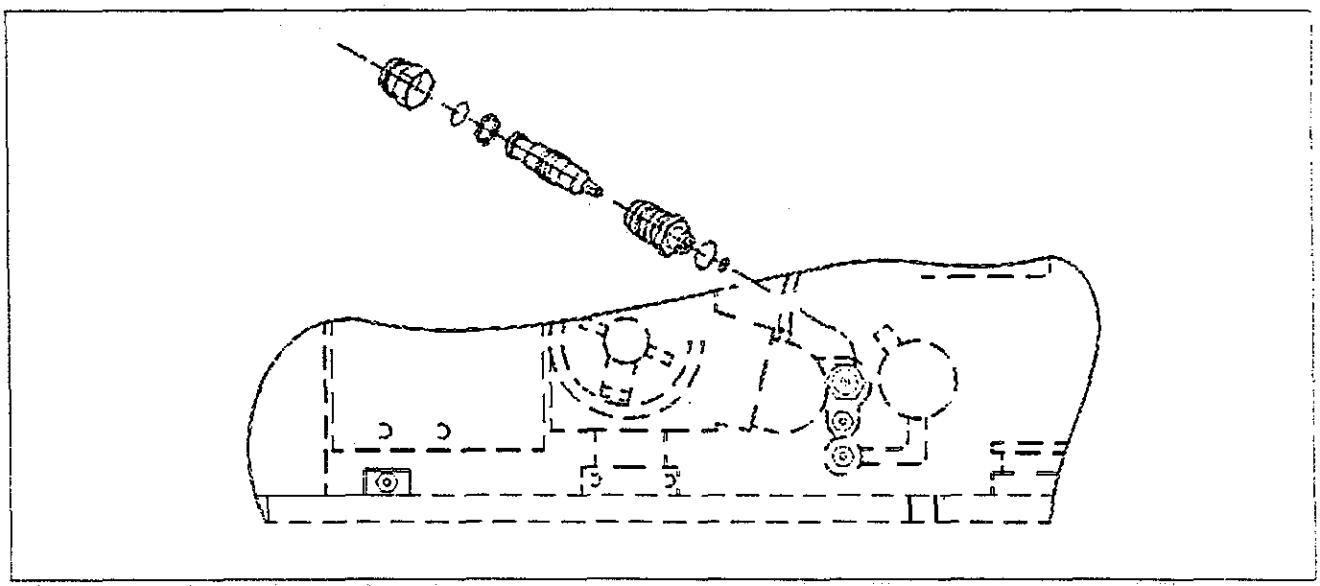


Fig. 12.0

**13.0 BARBED TUBE FITTINGS P/N 00576:**

**13.1** Install O-rings (P/N 00114) onto the three barbed fittings.

**13.2** Install and secure using ¼" nut driver, the barbed fittings to the manifold castings as follows (See Fig. 14.0):

**14.0 PRESSURE TRANSDUCER SAFETY VALVE/MANOMETER TUBING ASSEMBLY P/N 10080:**

**14.1** Install bracelets (P/N 01587) over each tubing end.

**14.2** Lubricate O-ring (P/N 06435) and insert tee connector #1 (P/N 06409) into safety valve cap (P/N 00172A).

**14.3** Connect distal end of tubing #6 to barbed fitting closest to purge valve (P/N 10180) assembly.

**14.4** Connect distal end of tubing #4 to barbed fitting furthest away from purge valve. Center leg of tubing #5 not connected at this time.

**14.5** Connect distal end of tubing #1 to barbed fitting of pressure transducer. Tubing #2 will connect to the barbed fitting on the exhalation valve assembly when installed. Tubing #2 not connected at this time.

**14.6** Distal end of tubing #7 with blue orifice is for manometer, not connected at this time.

**15.0 PRESSURE TRANSDUCER PC BOARD ASSEMBLY P/N 09680:**

**15.1** Install three new O-rings (P/N 03372) into counter bore ports in manifold base.

**15.2** Place Transducer PC Board Assembly onto manifold casting, positioning the three pressure ports from the transducer to align with the three ports and O-rings in manifold base.

**15.3** Secure Transducer PC Board Assembly to manifold base with four Allen screws (P/N 03220) using a 7/64" Allen torque screwdriver.

**NOTE:** Torque Allen screws (P/N 03220) evenly to 16 inch ounces. First run screws down to make contact with PC Board.

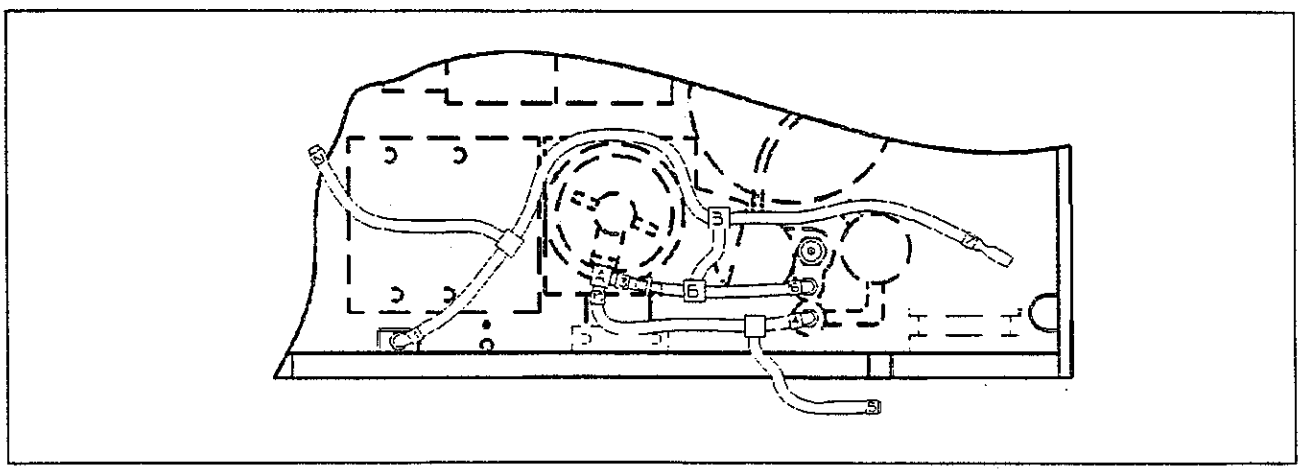


**Fig. 14.0**

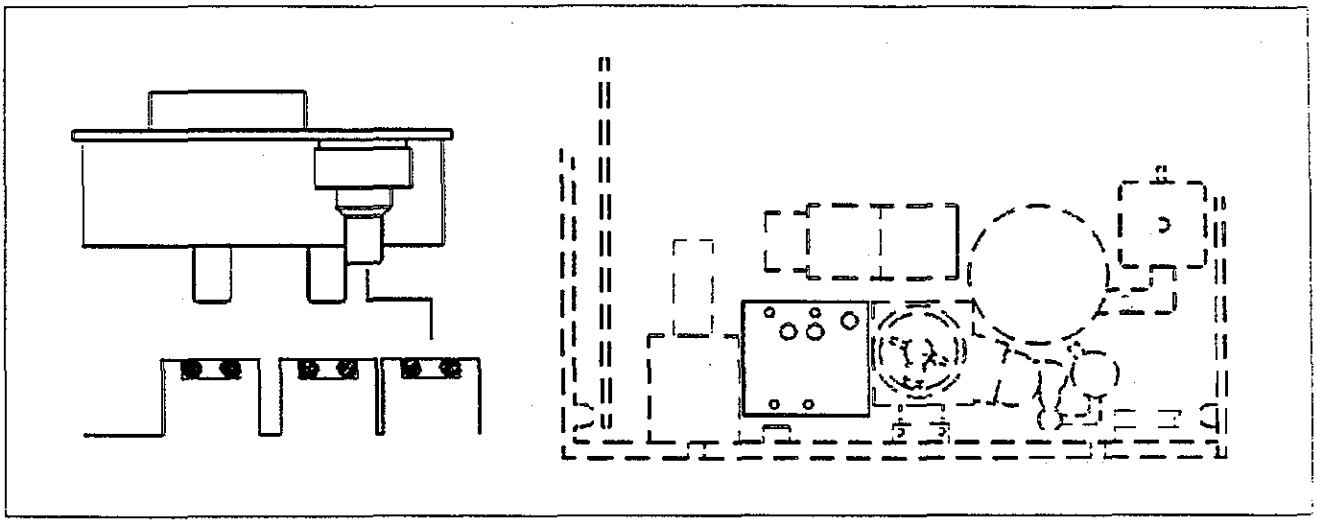


Fig. 15.0

**16) FLOW CONTROL VALVE ASSEMBLY P/N 09740:**

**16.1** Install two O-rings (P/N 03374) into counter bores of flow control valve body.

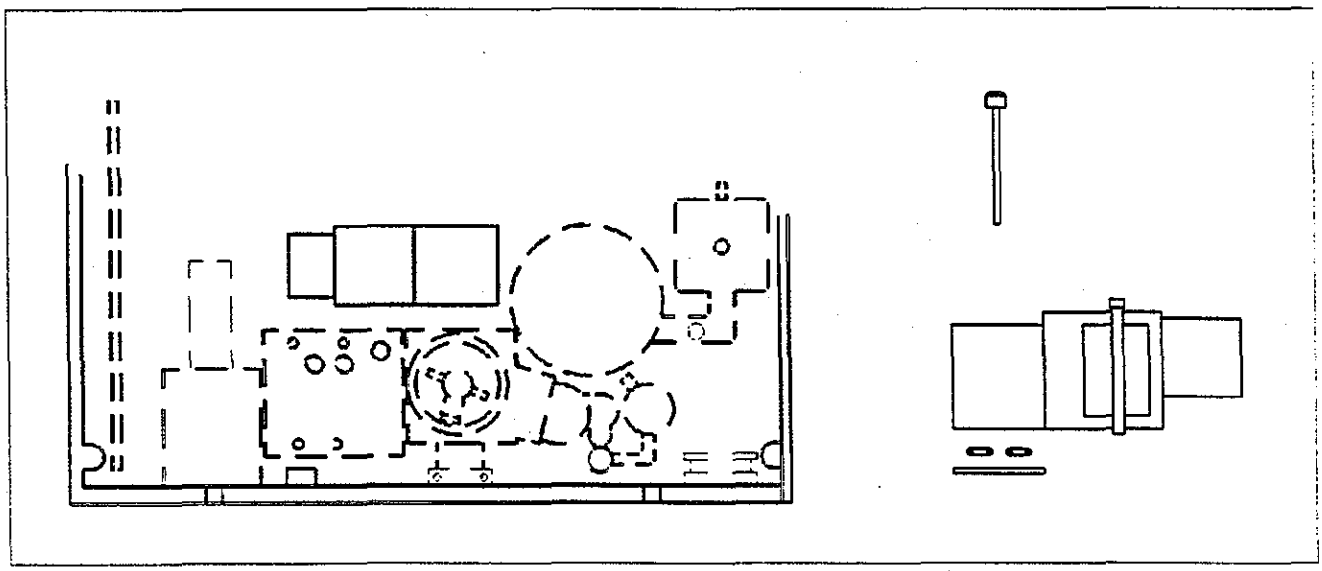
**16.2** Position and align holes of flow control valve gasket (P/N 08880) with holes in flow control valve body mounting pad on manifold base.

**16.3** Seat Flow Control Valve Assembly onto gasket.

**16.4** Using a 9/64" Allen driver, secure the two Allen screws (P/N 03218).

**NOTE:** Tighten screws evenly.

**16.5** Install dust cover (P/N 08930) and secure with tie wrap cable (P/N 05038) at conclusion of Operation Verification Procedure.



16.0

## 17.0 EXHALATION VALVE ASSEMBLY P/N 10083:

**17.1** Position exhalation valve assembly inside front of machine (lower left as you face front of unit), with tube fitting upwards.

**17.2** Secure with a 7/64" Allen driver, three screws (P/N 03219) in all but the lower left corner from the front.

**17.3** Into lower left corner recess of exhalation valve, place a button (P/N 20040) and spring (P/N 31004). While holding button depressed, position washer(P/N 04383) and retainer (P/N 20091) over remaining hole and secure using fourth screw (P/N 03219).

**17.4** Button should now be spring loaded and actuate smoothly.

**17.5** Connect tubing #2 to barbed fitting of exhalation valve assembly.

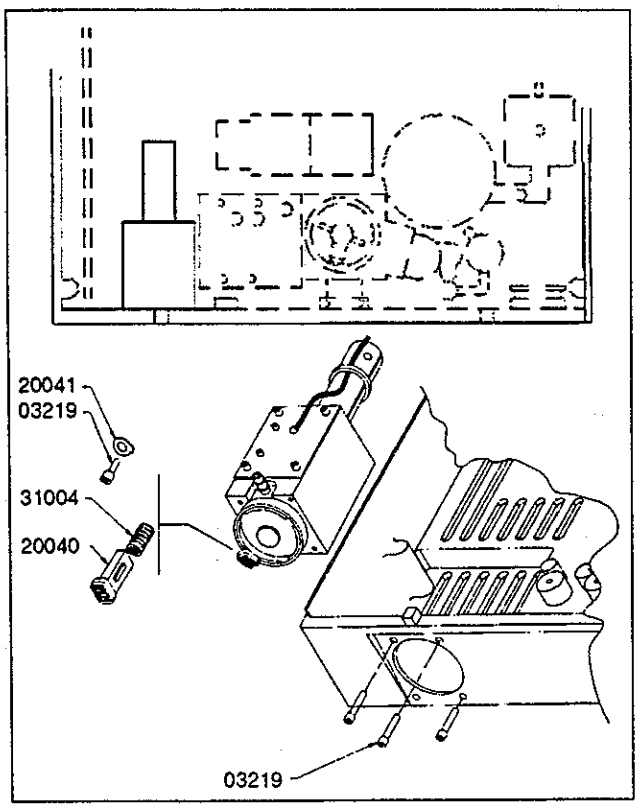



**Fig. 17.0**

## 18.1 REAR PANEL ASSEMBLY P/N 10131:

**18.1** Check condition of moisture seal strip (P/N 08882) on top of panel, replace if necessary.

**18.2** Install and secure O-ring (P/N 06194), filter element (P/N 06146) into Air Coalescing Filter Assembly (P/N 09762) and install transparent bowl, hand tighten only.

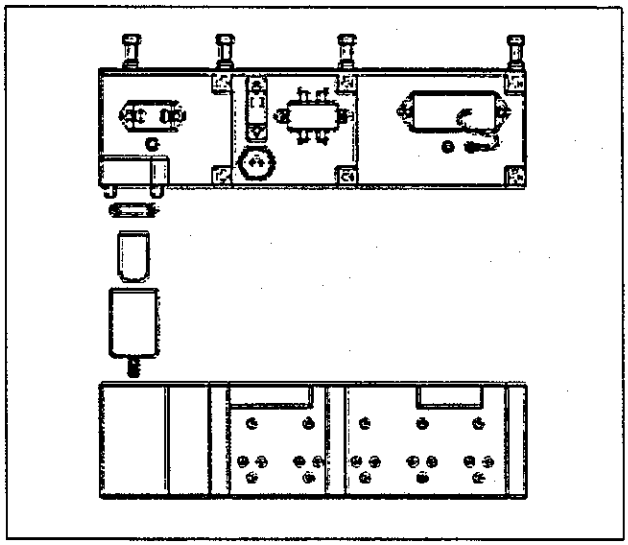


**Fig.18.1**

**NOTE:** Ensure that drain valve in bottom of bowl is closed.

**18.3** With all components on panel in place, position and align rear panel assembly down on top manifold assembly.

**18.4** Install, but do not secure at this time, four screws (P/N 03219) and washers (P/N 04383) using a 7/64" Allen screwdriver and hold rear panel in place.

**18.5** Connect and secure 6" tubing (P/N 03901) from inlet elbow fitting (P/N 32110) to filter inlet with hose clamp (P/N 09787).

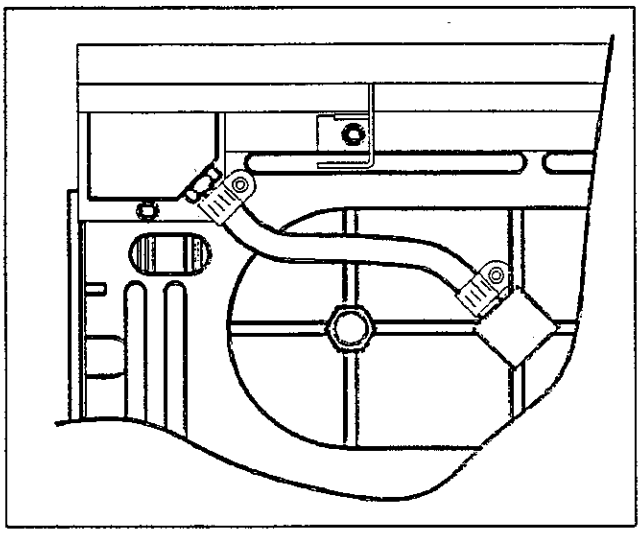


**Fig. 18.2**

## 19.0 POWER SUPPLY PC BOARD ASSEMBLY P/N 50020:

**19.1** Carefully remove Power Supply PC Board Assembly from anti-static bag and lower board down into place at back of manifold casting.

**19.2** Position two insulators (P/N 20097) onto inside rear of heat sink. Insulators are placed into recessed regions while registering with holes in heat sink. Press into place firmly.

**19.3** Install four screws (P/N 03221) through rear of heat sink into metal blocks on Power Supply PC board and tighten.

**19.4** Before securing panel, connect cable assembly (P/N 03515) from Bridge Rectifier to J5 on the Power Supply PC Board and the 6 pin connector of cable assembly (P/N 03513) from rear panel to J8 on Power Supply PC Board.

**19.5** Align IC regulator sockets with socket holes in rear of manifold casting (finned area). Hold Power Supply PC Board panel in place while installing and securing five screws (P/N 03219) with a $^{7}/_{64}$" Allen wrench.

**19.6** Connect Safety Solenoid assembly (P/N 08940) connector to Power Supply PC Board at J10.

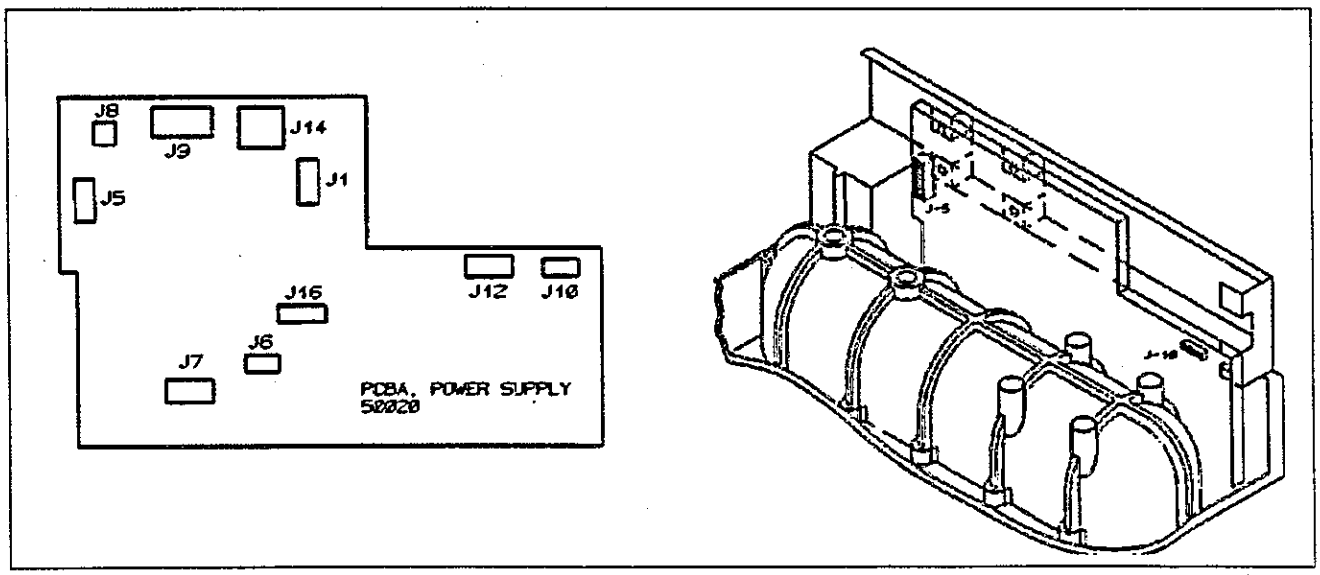



**Fig. 19.1**

**19.7** Facing rear of casting with long needle nose plier, carefully install the Mosfet IC (P/N 68001) onto 1st position of heat sink (left hand rear of casting). Use insulator (P/N 09672) between IC and casting.

**NOTE:** Refer to IC regulator insulation test before installing the next IC regulator. Check each regulator after installation.

**19.8** Install one Regulator (P/N 03752) into 2nd position of casting heat sink. Use Insulator (P/N 09672) between device and manifold. Place cover (P/N 09674) over device and attach using two screws (P/N 03233) and two washers (P/N 09674), which are provided with cover (P/N 09674).

**19.9** Install two Regulator IC's (P/N 03584) into 4th and 5th position of rear of casting heat sink. Use Insulator (P/N 09672) between device and casting, place cover (P/N 09674) over device and attach using two screws (P/N 03233) and two washers which are provided with cover (P/N 09674).

**NOTE:** 3rd position is empty. Perform insulationtest as per page 12-15, after each IC installation

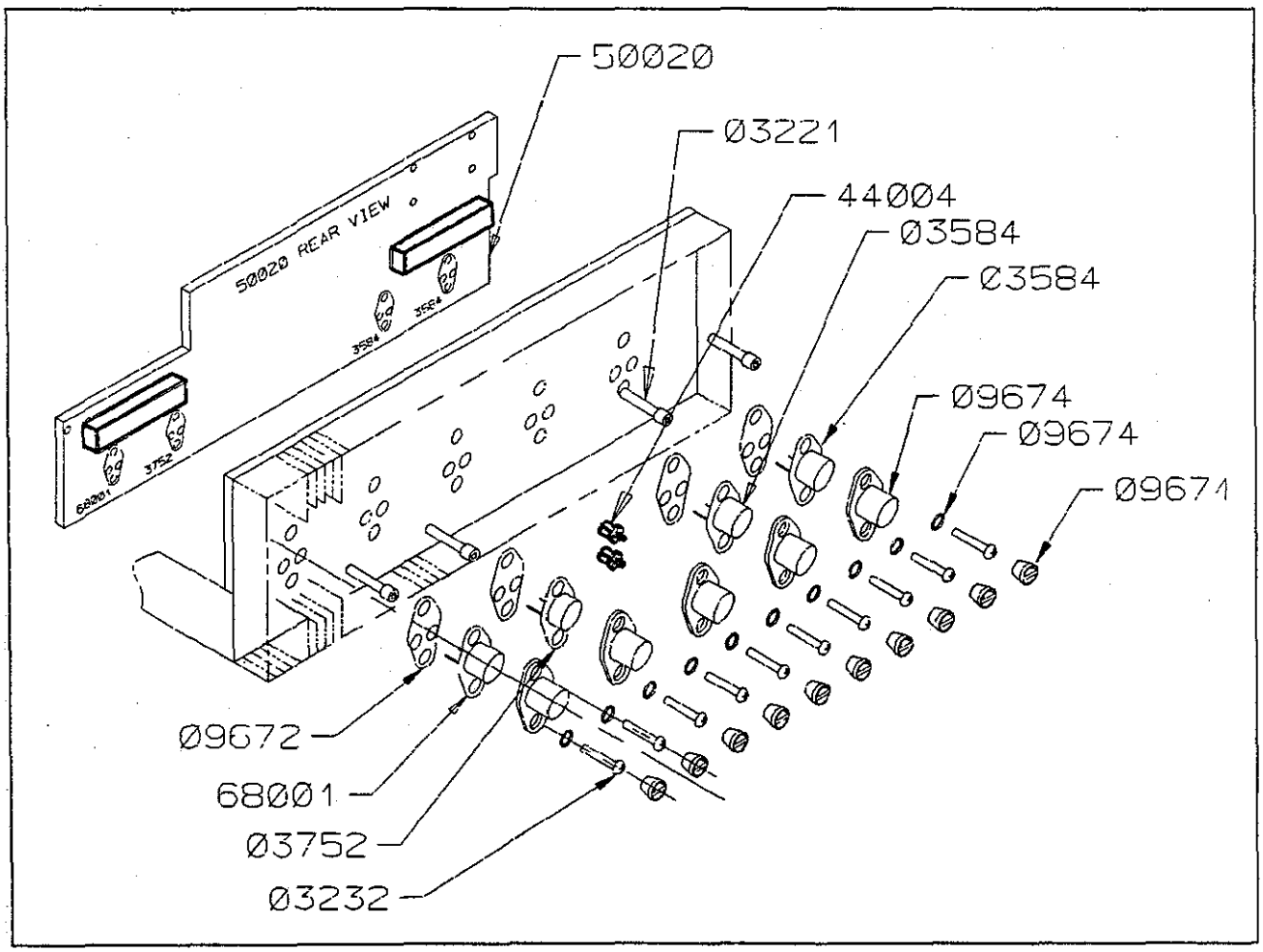



**Fig. 19.2**

## ■ IC REGULATORS INSULATION TEST:

- After installing each IC regulator, check circuit for proper insulation. With Ohmmeter, check to insure that circuit reads open from screwhead securing IC regulator to ground lug on rear panel below power entry module.

- If Ohmmeter reads low resistance or short implement troubleshooting guide, before continuing with next step, power transformer (P/N 09756) installation.

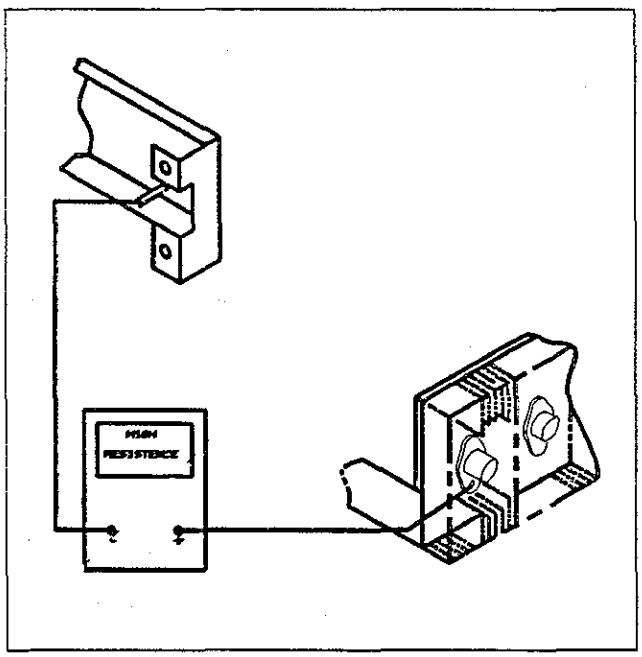


Fig. 19.3

## ■ IC REGULATOR TROUBLESHOOTING CHECK:

- Ohmmeter reads CLOSED instead of OPEN.

  - Cut in insulator (P/N 09672).
  - Misalignment of IC regulator socket into casting.
  - IC regulator not properly installed.

**NOTE:** If all checks correctly go to next step.

## 20.0 POWER TRANSFORMER ASSEMBLY P/N 09756:

**20.1** With multicolored primary wires facing rear panel, position transformer into mounting pad on accumulator manifold.

**20.2** Install, but do not secure at this time, secure $^{9}/_{64}$" Allen screws (P/N 08833).

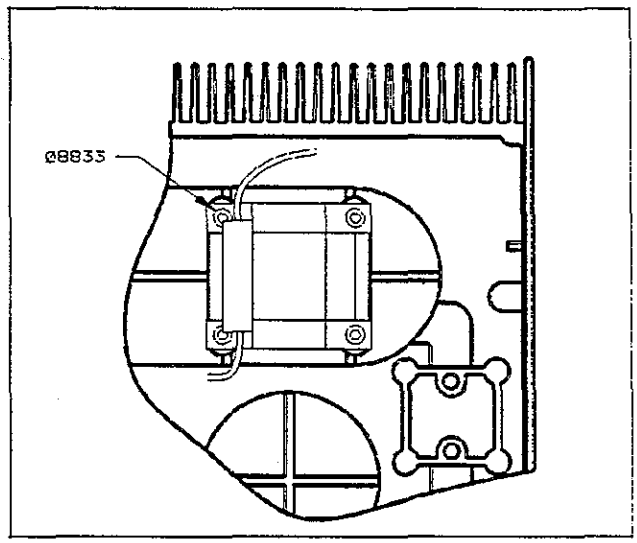



Fig. 20.1

**20.3** Connect primary wire terminals from transformer to power entry module as follows:

| |
|---|
| Gray from transformer to F on power entry module |
| Yellow from transformer to E on power entry module |
| Violet from transformer to D on power entry module |
| Orange from transformer to A on power entry module |
| Red from transformer to C on power entry module |

**20.4** Install transformer green/yellow ground wire to the ground lug stud at inside of rear panel located below the power entry module. Install nut (P/N 01066) and secure with $^{7}/_{16}$" deep socket.

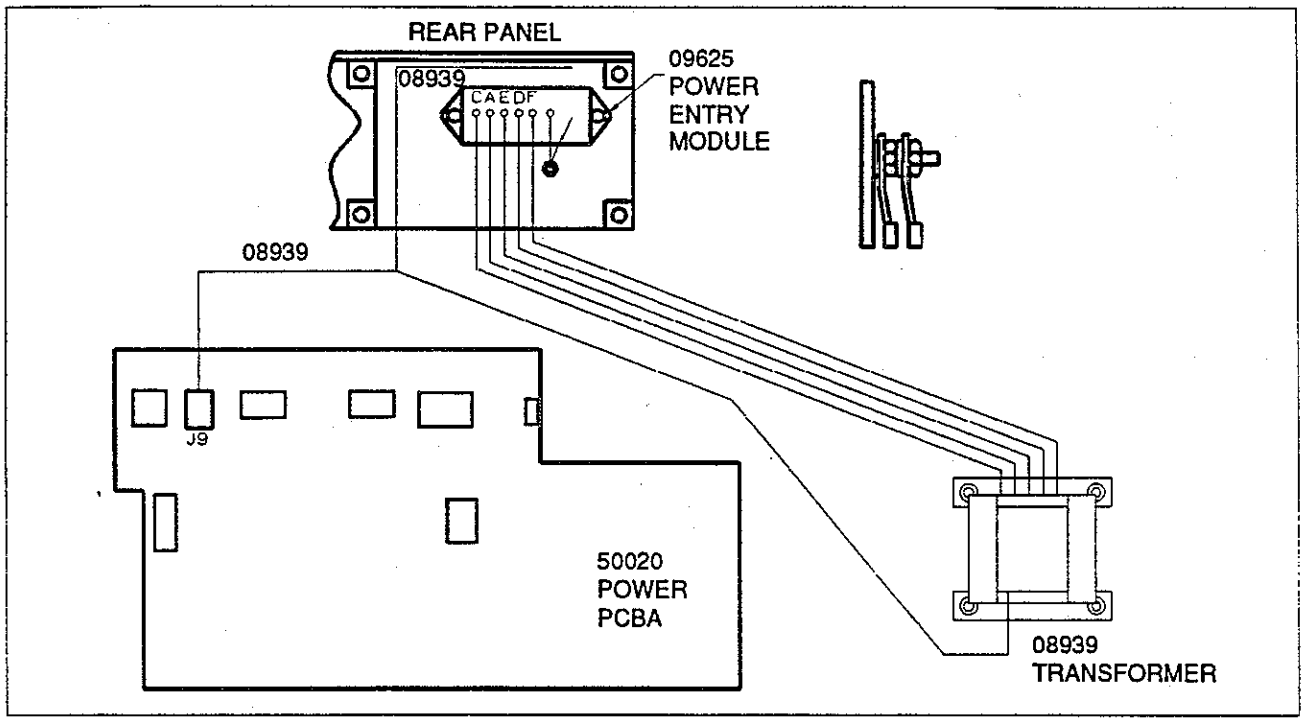



Fig. 20.2

**NOTE:** Make certain that ground wires do not touch transformer surfaces.

## ■ CONDUCTIVITY TEST:

- With transformer installed and wires properly connected, connect Ohmmeter from ground to screwhead holding 5 Volt IC regulator Generic 323, (Bird P/N 03752).
- Ohmmeter should read low resistance.

If problem exists:

- Recheck green yellow ground wire connections on rear panel and other end at middle pin of three pin connector.
- Check continuity of wire.
- If all is correct insert plugs into the IC covers (P/N 09674).

## 21.0 VERIFICATION POWER SUPPLY PC BOARD ASSEMBLY PROPER VOLTAGE OUTPUT:

**21.1** Insert 8 pin connector of Cable Assembly (P/N 03512) into J14 on Power Supply PC Board.

**21.2** Insert female end of power cord (P/N 09184) into Power Entry Module and plug male end into proper AC Power Source.

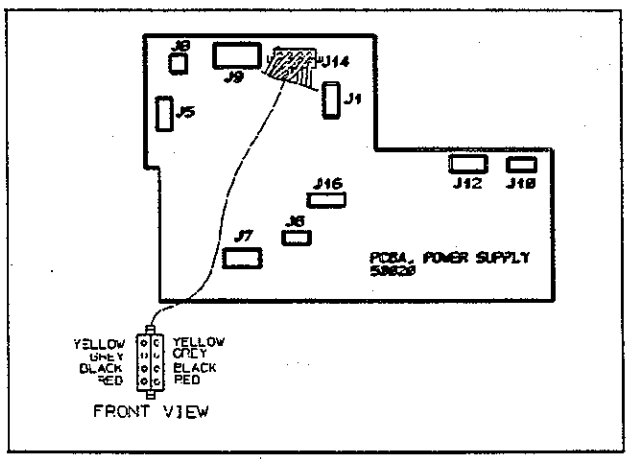



Fig. 21.0

**21.3** Set Main Power Switch to ON position.

**21.4** On the transformer 3 pin connector, measure two outer pins of the 3 pin connector of transformer, voltmeter should read 12-15 Volt AC. If not, check wiring to power entry module. If wiring is correct replace transformer. If transformer test outcome is good, plug 3 pin connector to J9 at Power Supply PC Board.

**21.5** Connect voltmeter to 8 pin socket of Power harness (P/N 03512) as follows and confirm the proper voltage outputs.

**21.6** Connect negative (-) from voltmeter to black lead on power harness.

**21.7** Positive lead (+) TO YELLOW = 14.7 to 20 VDC:

**21.8** Positive lead (+) TO RED = 5 VDC

**■ 14.7-20 VOLT DC FAULT CHECK:**

- Double check all connections of J5, J8, J9.
- Check fuse in power entry module and fuse F1 on Power Supply PC Board.
- Check that AC/ALT Power Switch is on the AC LINE position.

**■ 5 VOLT DC FAULT CHECK:**

- Check 5 Volt IC regulator socket for oversize connector.
- Replace 5 Volt IC regulator.
- Replace Power Supply PC board.
- Switch Main Power Switch OFF and remove power cord from ventilator and AC power supply source.

**■ BRIDGE RECTIFIER P/N 03798 FAULT CHECK:**

- Unplug J5 from Power Supply PC Board.
- With Ohmmeter, select lowest resistance range on Ohmmeter (diode check range preferable).
- Using an Ohmmeter, set selector knob to diode test range. Test bridge rectifier by connecting DMV red and black leads to bridge rectifier terminals as follows:

| | | RED 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| BLACK | 1 | - | >100 K | >100 K | >50 |
| | 2 | >100 K | - | >100 K | >50 |
| | 3 | <50 | <50 | - | >100 |
| | 4 | >100 K | >100 K | >100 K | - |

**NOTE:** Some multimeters may require red and black leads connected in reverse.

- Insert black lead in pin 3 and red lead to pin 1-2. Ohmmeter should read approximately 50 Ohms.
- Insert red lead in pin 3 and black lead to pin 1-2. Ohmmeter should read more than 100K.
- Insert exhalation valve cable connector into J6 and flow control valve cable connector into J7 on Power Supply PC Board.

## 22.0 FLOW SENSOR CONNECTOR PCBA P/N 50060:

**22.1** Install flow sensor connector and PC board (P/N 50060) assembly into lower front of casting as shown and secure with four 3/32" Allen screws(P/N 03226).

**22.2** Install new O-ring/gaskets (P/N 20192) inner/and outer (P/N 20191).

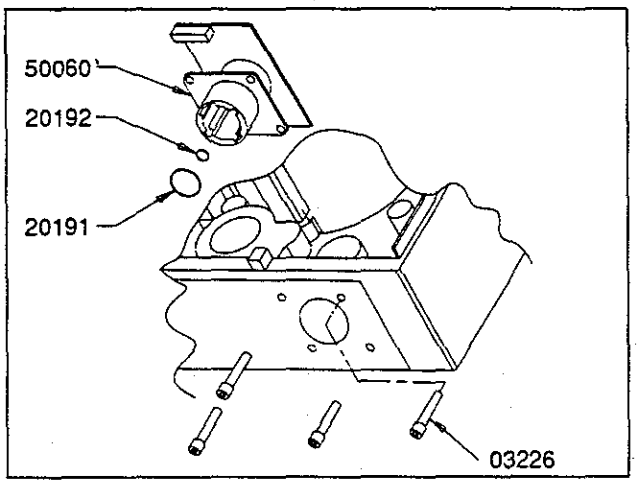



Fig. 22.0

## 23.0 FLOW/VOLUME TRANSDUCER PCBA AND MANIFOLD ASSEMBLY P/N 50030:

**23.1** Carefully remove Flow/volume Transducer PCB from anti-static bag.

---

**NOTE:** If manifold and solenoids were removed, reinstall manifold/solenoids onto transducer board at this time, using the two 7/64" Allen screws.

---

**23.2** Reconnect the 4 pin solenoid plug at J12 on the Power Supply PC board.

**23.3** Connect supply tubing #5 to second fitting from top of flow transducer manifold. From power transformer, loosen the two screws facing the Display PCB assembly. Slide the flow transducer mounting bracket under the two screws heads and use a 9/64" Allen wrench to secure.

**23.4** Reconnect the short end of ribbon cable (P/N 15022) from the intermediate plug connection to J17 on the Flow Volume Transducer PC board.

**23.5** Reconnect the intermediate plug to J17 on the Flow Sensor connector PC board (P/N 50060).

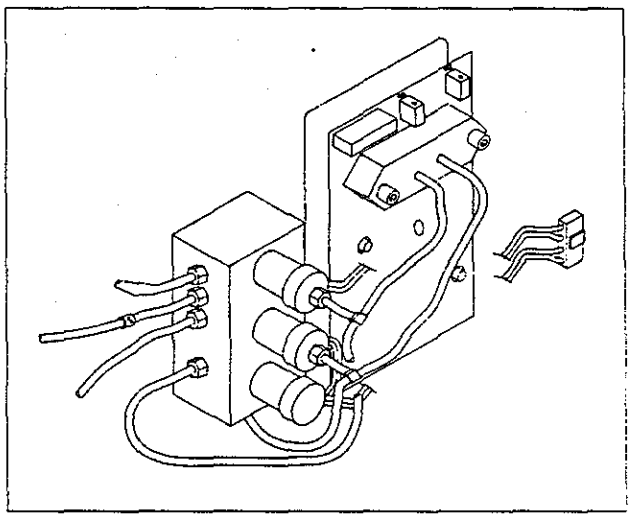


Fig.23.0

## 24.0 MAIN PCB ASSEMBLY P/N 50010:

### ■ MAIN PCB ASSEMBLY BRACKETS P/N 09690:

- Install brackets into manifold base using 2 each Allen screws (P/N 03219).
- Position brackets on recesses vertically with "U" shape facing inward and secure with 3/32" Allen driver.
- Carefully remove Main PCB Assembly from anti-static bag.
- Position Main PC Board Assembly with components towards center of unit. Connect cables as outlined before securing board in place.

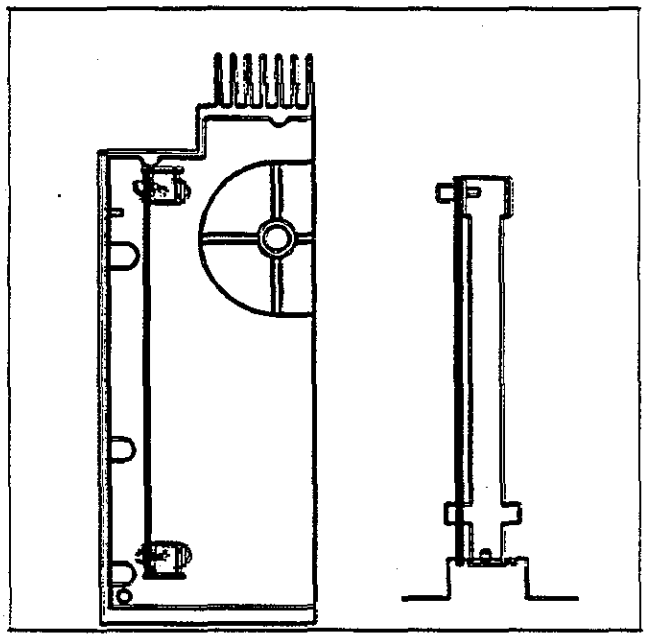


Fig. 24.1

- Ribbon cable (P/N 71501) from Power Supply PC Board Assembly to J1 at Main PC Board Assembly.
- Cable (P/N 03512) 8 pin connector from Power Supply PC Board Assembly to J14 on Main PC Board Assembly.
- Ribbon cable (P/N 08938) from Transducer PC Board Assembly to J4 on Main PC Board Assembly.
- Install Fiber Optic Cable (P/N 15045) from rear panel to Socket J15 on Main PC Board Assembly.
- Ribbon cable (P/N 15025) from Power Supply PC Board to J16 on Main PC Board Assembly.
- Ribbon cable (P/N 15022) from Flow/ Volume Transducer Connector to J17 on Main PC Board Assembly.
- Connect the volume control alarm wires from rear panel to JP17 on Main PC Board Assembly.
- Place Main PC Board Assembly in grooved slots in manifold base and attach to brackets. Install two Allen screws (P/N 03219) and secure with $^{7}/_{64}$" Allen driver.

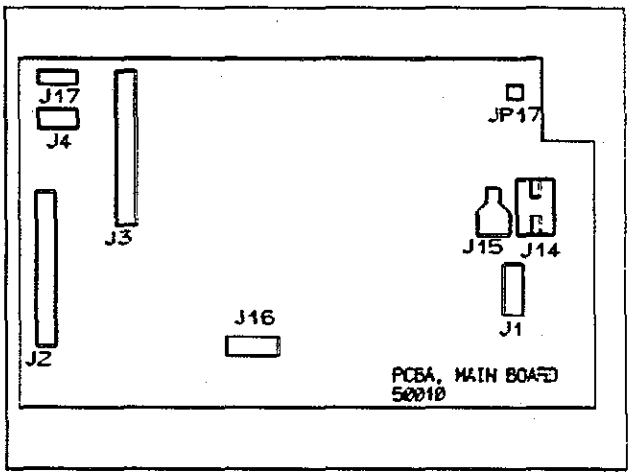



Fig. 24.2

## 25.0 FRONT PANEL/DISPLAY PC BOARD ASSEMBLY P/N 50000:

**25.1** Carefully remove Display PC Board Assembly front anti-static bag.

**25.2** Prior to installing Display PC Board Assembly to front panel housing, a resistance check of the potentiometers must be performed first.

**25.3** Plug cable assembly (P/N 15118) (long cable) into J2 and plug cable assembly (P/N 15115) (short cable) into J3 on Display PC Board.

**25.4** Connect Ohmmeter at locations on Display PC Board as shown in Fig. 25.0. Reading must be 650 OHMS.

**25.5** Readjust if necessary by turning trimpot at R40 location.

**25.6** Ensure that cables are correctly connected to J2 and J3.

**25.7** If Ohm reading is still not correct, replace Display PC Board before continuing with the next step.

**25.8** Attach Display PC Board Assembly to rear of front panel housing.

---

**NOTE:** Make certain that there are no nuts on pots before installation. Align and insert potentiometer shafts through holes in front panel. Facing rear side of Display PC Board Assembly panel, install four (4) Allen screws (P/N 03219) using a $^{3}/_{32}$" Allen wrench.

---

**25.9** Install all 14 Jam nuts (P/N 03281) on the mode control and potentiometer shafts. Tighten Jam nuts with $^{5}/_{16}$" nut driver, or torque 40 inch ounce equally.

**25.10** Install friction nuts on all 13 potentiometers. (Not the mode select switch.)

**25.11** Tighten the friction nuts until potentiometers have the same friction feel.

**25.12** Install knobs (P/N 20238).

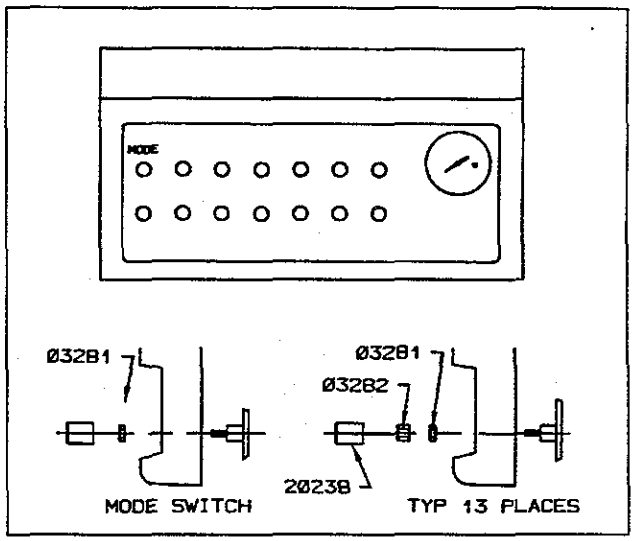



**Fig. 25.1**

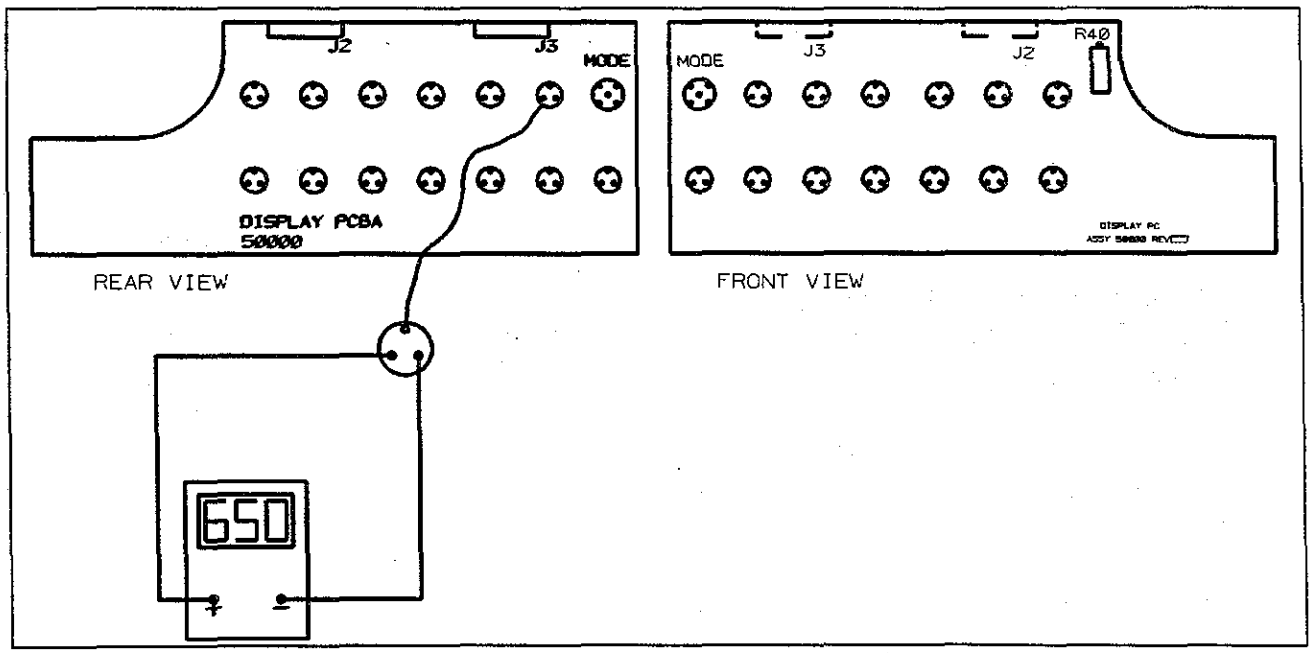



**Fig. 25.0**

## 26.0 PRESSURE MANOMETER ASSEMBLY P/N 09799, WITH PLUG P/N 04876 INSTALLATION:

### ■ REPLACE FRONT PANEL:

- Remove protective bezel lens from new manometer.
- Ensure that the surface around bezel hole opening of the front panel rear surface is clean.
- Place R.T.V. sealing material on the inside of the front panel around the hole opening.
- Install clean bezel lens flange (P/N 20048) against the inside of rear panel with calibration hole in the three o'clock position. Remove excess sealing material.

**26.1** Install, position new manometer against lens, using two brackets (P/N 09639), with long leg of bracket retaining manometer lip. Secure manometer in place with two Allen screws (P/N 03219) using a 7/64" Allen driver.

**NOTE:** Confirm that calibration hole in bezellens is aligned with manometer calibration screw position (three o'clock) before securing manometer.

**26.2** Install plug (P/N 04876) in calibration hole.

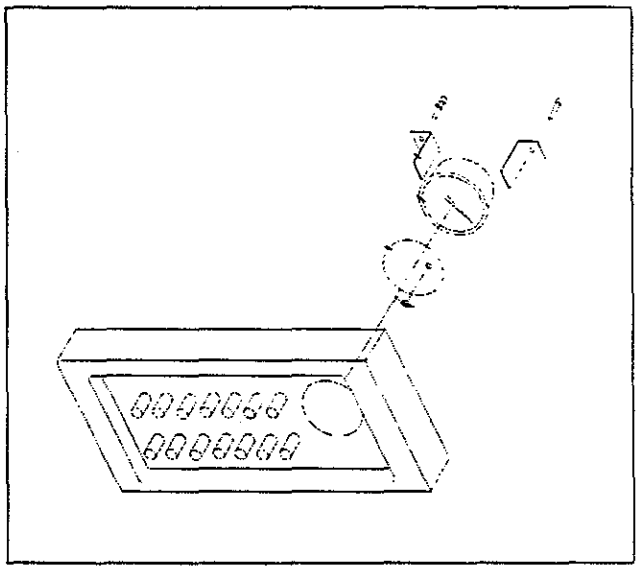


**Fig. 26.1**

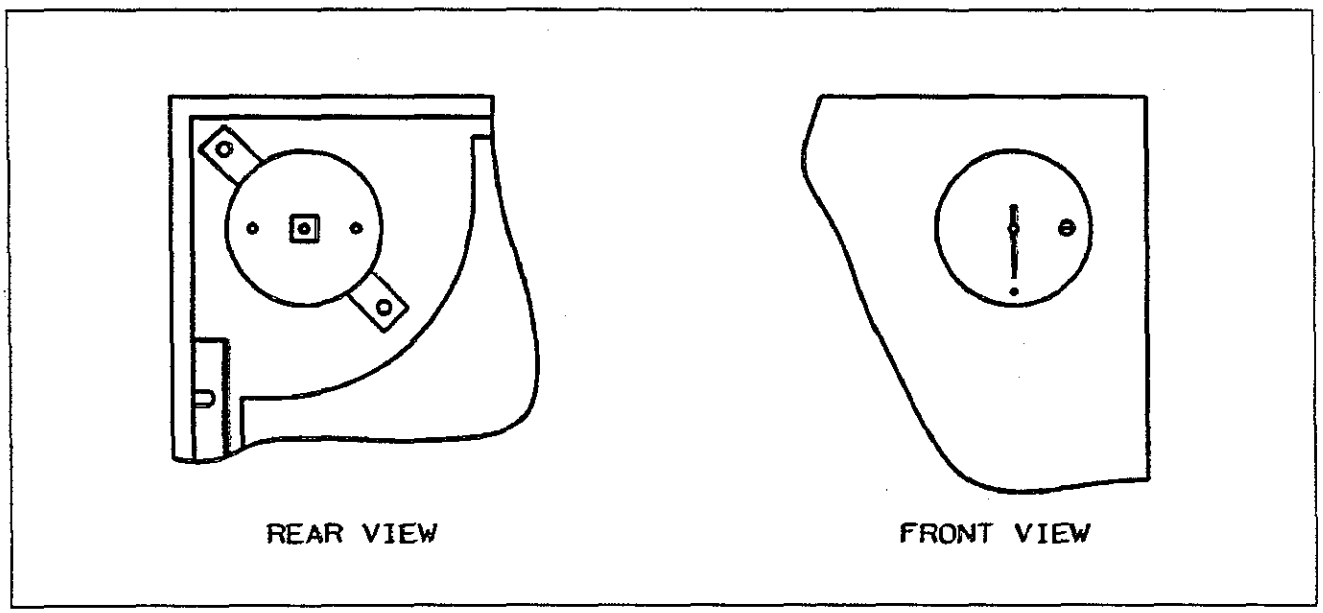



**Fig. 26.2**

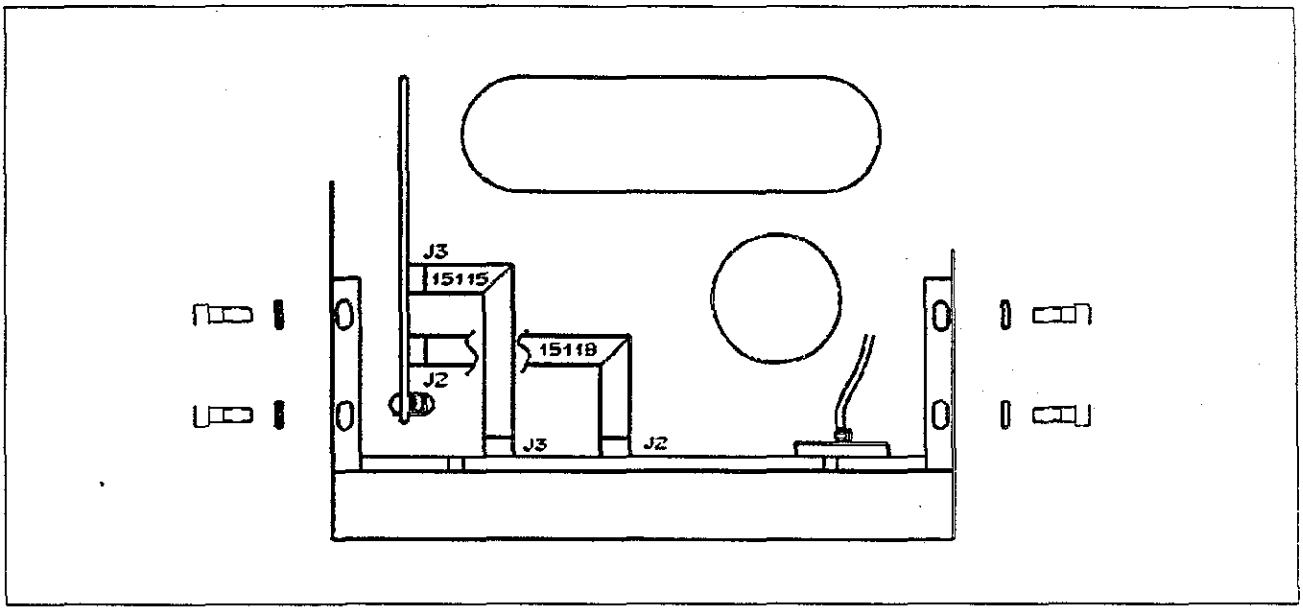



Fig. 27.0

**27.0 FRONT PANEL ASSEMBLY TO MANIFOLD INSTALLATION P/N 15024:**

**27.1** Position front panel brackets on top of manifold base and align slots in bottom of panel brackets to align with screws holes in base.

**27.2** Install 4 washers (P/N 08964) and 4 Allen screws (P/N 03219) through holes and secure screws with a $^{7}/_{64}$" Allen driver.

**27.3** Connect remaining tube #7 of tube assembly (P/N 10080) to manometer and secure with cable tie wrap (P/N 07803).

**27.4** Plug long ribbon cable assembly (P/N 15118) from front panel assembly into Main PCB Assembly at location J2.

**27.5** Plug short ribbon cable assembly (P/N 11515) into Main PC Board assembly at J3 location.

**28.0 POWER CORD ASSEMBLY P/N 08925:**

**On present units, proceed as follows:**

**28.1** Attach female end (angled connector) of Power Cord Assembly into 3 pin socket in Power Entry Module located at left side of rear panel.

**28.2** Use clamp (P/N 06148) and secure power cord by inserting screws (P/N 04381) through holes in clamp and tightening into hole located in rear panel below Power Entry Module.

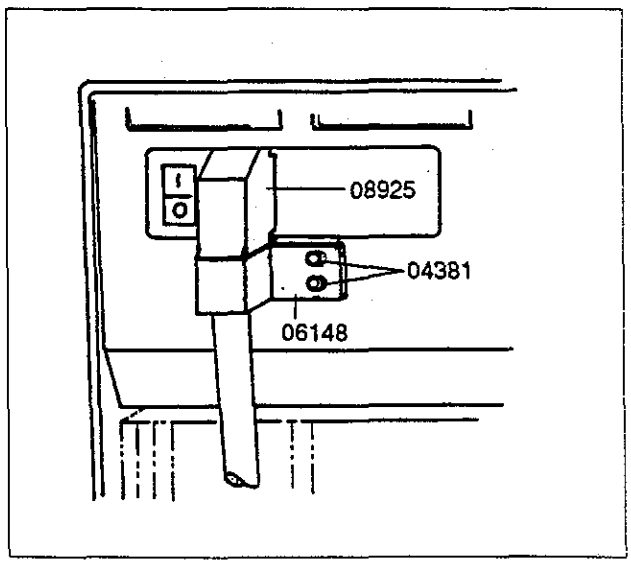



Fig. 28.0

## 29.0 TOP COVER ASSEMBLY P/N 09698 INSTALLATION:

**29.1** At completion of operational verification procedure:

a) Check and if necessary, replace moisture seal (P/N 08879X) on top cover lip.

b) To install top cover on manifold base, raise back of cover and slide panel forward to slip front lip under front panel housing.

c) Lower cover down onto manifold base and secure using $^{9}/_{64}$" Allen driver and two Allen screws (P/N 03222) with two washers (P/N 02159) inserted from under manifold base.

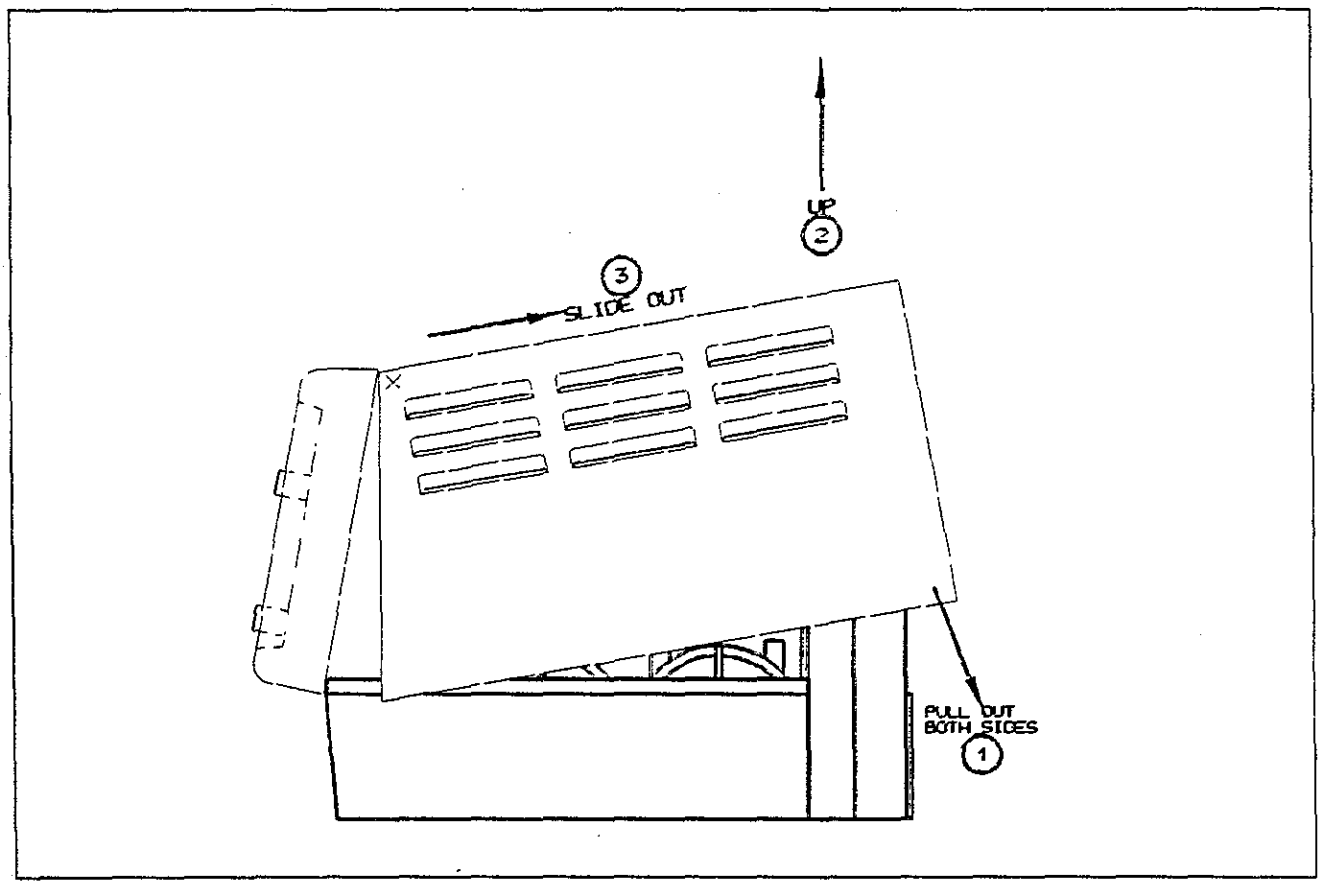



**Fig. 29.0**